BERCHTOLD®

OPERON® B 810
SERVICE & PARTS MANUAL

SERVICE AND PARTS MANUAL 70-000-0027

Related Publications:
OPERON B 810 Installation and Operator Manual 70-001-0026
OPERON B 810 Uncrating Instructions 60-000-0002

The service and parts manual is meant to be used as a reference in performing preventative and corrective maintenance on the OPERON B 810 surgical table. The successful completion of a factory training program is required to properly and effectively troubleshoot, repair, and maintain the OPERON B 810 surgical table.

BERCHTOLD Corporation assumes no liability for table performance when used with accessories designed by others for use on the OPERON B 810 surgical table or damage to the OPERON B 810 surgical table resulting from the use of accessories designed by others.

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- IMPORTANT -
THE SAFETY INSTRUCTIONS THAT FOLLOW APPEAR WITHIN THE MANUAL.
READ THEM CAREFULLY BEFORE OPERATING THE UNIT AND FOLLOW INSTRUCTIONS.

SPECIAL SAFETY INSTRUCTIONS

SAFETY SYMBOLS

This manual uses special symbols to help alert you to important safety information:

*This symbol identifies a **WARNING**. A warning indicates that the procedure in the following text involves actions that could cause harm or death to an individual if certain precautions are not taken. The warning text always provides specific information on what you must do to avoid the risk.*

*This symbol identifies a **CAUTION**. A caution indicates that the procedures in the following text involve actions that could cause damage to the equipment, including the failure to operate. The caution text always provides specific information on what you must do to avoid the risk.*

*This symbol identifies a **NOTE**. A note contains information that can help you perform the procedure in the following text more effectively.*

USE CONDITIONS

***WARNING** — POSSIBLE EXPLOSION HAZARD: **Do not operate the table in the presence of flammable anesthetics.** The **OPERON B 810** table is designed for use in non-hazardous anesthetizing locations.*

POWER SUPPLY

***WARNING** — ELECTRICAL HAZARD: Repeated breaker tripping or fuse replacement may indicate a ground fault or overload condition. The table will not operate reliably under such a condition and may be electrically unsafe. Do not use the table until this condition is corrected.*

PINCH POINTS

***WARNING** — Cutting or crushing injury may occur if any part of a patient or staff member is caught in a pinch point when the table is articulated.*

***CAUTION** — Damage to the table or object may occur if any foreign object, is caught in a table pinch point when the table is articulated.*

Pinch points include, but are not limited to:

1. Kidney elevator to seat top
2. Kidney elevator to seat channels
3. Kidney elevator to back section
4. Headrest to back section
5. Back section link to seat channel
6. Back section to side shields
7. Side shields to column shields (in tilt)
8. Column shields to base cover
9. Base to floor
10. Floor feet to base
11. Floor feet to floor
12. Leg section to column shield

This list is not all-inclusive because pinch points can be created by the attachment of accessories. Always check that the patient and staff are clear of pinch points before and while the table is in motion. Refer to FIGURE 2-1 for details.

LOAD CAPACITY

This table has a patient lifting and articulation capacity of 600 lb (273 kg). Positioning and constraints are discussed on page S-3. Do not exceed this maximum load in service. See FIGURE S-1.

WARNING

WARNING *— Overloading may result in tipping of the table or failure of the table sections to move. Do not exceed the maximum load in service.*

NOTE

NOTE *— The use of some positioning capabilities or table accessories will put additional restrictions on patient weight. Accessories provided by Berchtold Corp., when used as intended, are designed to perform safely with the patient loads for which this table was designed. A Berchtold Corporation accessory that puts additional restrictions on patient weight, when used as intended, will be clearly labeled to indicate the maximum allowed loads.*

The table load capacity is 400 lb (181 kg)) when the beach chair accessory is installed on the table.

The table load capacity is 300 lb (136 kg) when the fracture attachment unit is installed on the table.

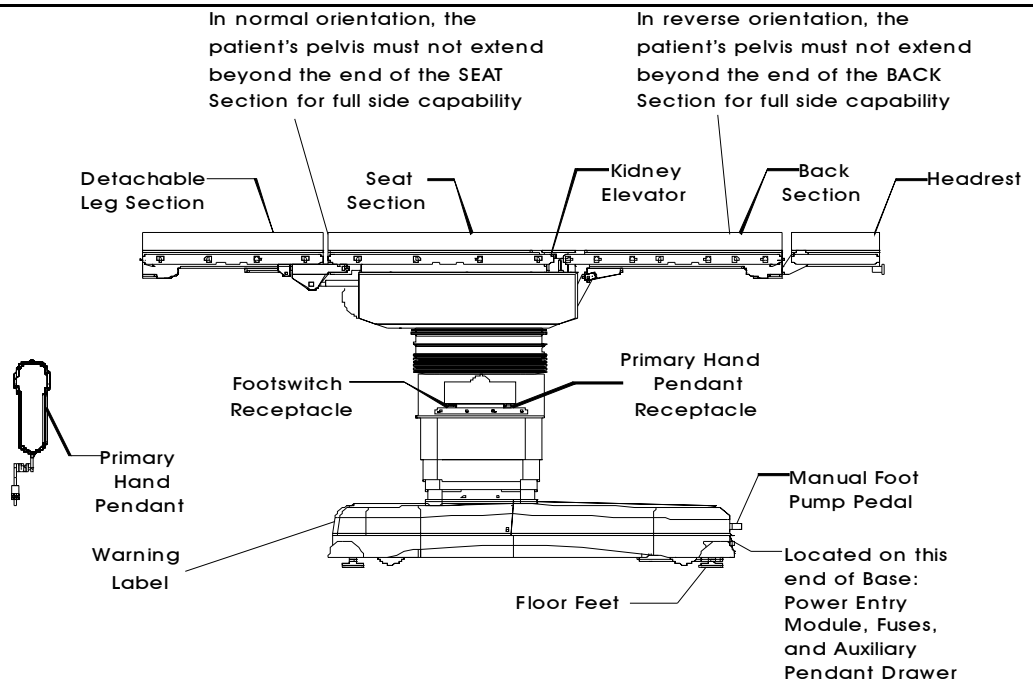

In normal orientation, the patient's pelvis must not extend beyond the end of the SEAT Section for full side capability
In reverse orientation, the patient's pelvis must not extend beyond the end of the BACK Section for full side capability
Detachable Leg Section
Seat Section
Kidney Elevator
Back Section
Headrest
Footswitch Receptacle
Primary Hand Pendant Receptacle
Primary Hand Pendant
Manual Foot Pump Pedal
Warning Label
Floor Feet
Located on this end of Base: Power Entry Module, Fuses, and Auxiliary Pendant Drawer

FIGURE S-1 MAXIMUM WEIGHT LOCATION

PATIENT POSITIONING

WARNING *— POSSIBILITY OF TIPPING: Table stability may be compromised if patients are positioned beyond the following limits:*

Normal Patient Orientation

The patient's pelvis should not be extended beyond the end of the seat section. The patient's legs may be placed on a leg extension attached to the end of the leg section.

Reversed Patient Orientation

The Patient's pelvis should not be extended beyond the back section. The patient's legs may be placed on a leg extension attached to the end of the back section.

WARNING *— POSSIBILITY OF TIPPING: If FULL SLIDE FORWARD IS REQUIRED, the patient's pelvis must always be located over the seat section when in normal orientation. Utilizing full forward slide while the patient's pelvis is on the leg section can impair table stability and result in patient injury or equipment damage.*

WARNING *— The leg section may be removed from the table. If it is left on the table, use caution when raising the leg section while the patient is in the normal perineal position.*

Full articulation and full slide in either direction can be safely achieved with a 600lb (273kg) patient if these steps are followed.

PATIENT ORIENTATION

WARNING *— Before positioning the table, be sure the correct table orientation is selected as indicated by the NORM or REV indictor on the primary control pendant. Improper orientation will result in reverse functioning and potential patient injury.*

OPERATION

WARNING*— The table should always be locked to the floor whenever a patient is on the table or being transferred to or from the table. This is accomplished by extending the table's feet by activating the FLOOR LOCK function.* ***This table is not intended for patient transport.***

CAUTION *— Storage of clamps, accessories, etc., on the base cover may result in damage to lift column shields and prevent proper elevation or descent of the table.*

TABLE MOVEMENT WITH PATIENT

WARNING *— If the table needs to be moved with a patient on the table, it is very important to follow the following instructions to prevent patient injury or equipment damage.*

WARNING *— The table should not be used to transport a patient over a long distance. This procedure is only meant for repositioning the table in the surgical suite.*

PRIMARY HAND PENDANT FUNCTIONS

WARNING *— The primary hand pendant is configured for normal patient orientation. If the patient is reversed, the back function must be used to raise or lower the patient's legs and the leg function must be used to raise or lower the patient's back. Trendelenburg, tilt, and slide functions are also reversed if the patient is in reverse orientation.*

AUXILIARY HAND PENDANT

WARNING *— The auxiliary hand pendant is configured for normal patient orientation. If the patient is reversed, the Back function must be used to raise or lower the patient's legs and the Leg function must be used to raise or lower the patient's back. Trendelenburg, tilt and slide functions are also reversed with respect to the patient's orientation.*

WARNING *— The auxiliary hand pendant functions will operate regardless of whether the floor feet are locked or unlocked. If the floor feet are unlocked, the table may roll when the manual pump is operated.*

CAUTION *— The auxiliary hand pendant does not have the following functions: FLEX, CHAIR, RETURN TO LEVEL, or SLIDE. This pendant is intended to be used for completing procedures, followed by charging the batteries or servicing the table.*

HEADREST

WARNING *— Do not mount knee crutches or legholders to the headrest side rail. The headrest should only be used for supporting the head or feet. Do not lean on the headrest. The headrest has a weight limit of 25 lbs.*

WARNING *— When articulating the headrest, be sure that the locking mechanism engages completely, and does not hang in between positions. Until the locking mechanism engages, the headrest may move when a load is applied.*

WARNING *— When releasing the locking mechanism, support the headrest, as it will fall freely if the locking mechanism is not engaged.*

REMOVABLE LEG SECTION

WARNING *— Failure to securely lock the leg section into place may result in patient injury. Always check the retention of the leg section upon installation.*

ACCESSORIES DESIGNED BY OTHERS

Berchtold Corporation assumes no liability for table performance when used with accessories designed by others for use on Berchtold equipment, or damage resulting to Berchtold equipment resulting from the use of accessories designed by others.

RADIOLUCENT TABLE TOP AND PADS

CAUTION *— The anti-static properties of the table depend on the use of the recommended mattress. Compromise of the anti-static properties could expose the patient or OR personnel to an electrostatic shock. It could also deliver a shock to the table's electronics that could damage or destroy critical components.*

CAUTION *— Protect the top and bottom surfaces from nicks and scratches. Scratches more than 0.005 inches (127 microns) deep may appear on x-rays. Damaged or scratched panels should be replaced if x-ray quality is affected.*

FOOTSWITCH (OPTIONAL)

CAUTION *— The Footswitch's electrical connections are resistant to fluid intrusion, but if fluid drainage is anticipated, the footswitch should be protected by wrapping it with a clear disposable footswitch bag. This will reduce the need to disinfect the footswitch.*

HYDRAULIC SYSTEM

WARNING *– POSSIBILITY OF INJURY: The hydraulic system must be kept free of contamination. Contamination can cause the hydraulic system to fail, resulting in personnel or injury or equipment damage.*

CAUTION *– The hydraulic system on the OPERON B 810 surgical table contains micro-hydraulic valves, which are very sensitive to contamination. Only a qualified, trained service technician should open the hydraulic system, and only after all other repair procedures have been tried. Always use clean tools, and cover or wrap any loose hydraulic lines with clean plastic bags.*

HOLLOW PLUGS

CAUTION *– Do not over tighten the hollow plugs. Over tightening can cause the seals to deform and leak.*

CAUTION *— Hollow plugs used in the hydraulic system have different torque values than the mechanical fasteners. See Table 4-3 for hollow plug torque requirements.*

HYDRAULIC FLUID

CAUTION – Do not mix hydraulic fluid types. Other hydraulic fluids can be incompatible with the seals in the OPERON B 810 table and can cause equipment failure or reduce the service

life. (See drawing 306762 for correct fluid designation.)

ELECTROMAGNETIC INTERFERENCE

WARNING *— When using the table in the vicinity of high-frequency surgical equipment, such as cardiac defibrillators and cardiac defibrillator monitors, refer to the equipment manufacturers' instructions to ensure compatibility issues are considered.*

ELECTRICAL SYSTEM

WARNING – *When servicing the table, turn power off or remove the appropriate fuses to prevent personal injury. If power is required, use care to avoid contact with live parts.*

WARNING – *Even a "dead" battery can contain enough power to cause a serious shock or explosive spark. Always disconnect the battery charger plug at the power center before disconnecting cables.*

WARNING – *The batteries contain acid, which can cause serious burns. While the batteries are sealed, a dead battery may be damaged and may leak. Always handle batteries in a way that will prevent acid from spilling on your skin or clothes.*

SERVICE PROGRAM

CAUTION —*The Service Program will allow you to set motor parameters outside the min. and max. values of 100 to 1000. Setting the parameters to the extreme min. or max. value could lead to damage to the table or its components, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

CAUTION —*The Service Program will allow you to set valve parameters outside the min and max range of 100-300MSec. This could lead to damage to the table or its components, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

CAUTION —*The Service Program will allow you to set sensor parameters outside the min and max range shown in TABLE 6-1. This could lead to damage to the table or its components, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

CAUTION —*The Service Program will allow you to set ACCU (battery) parameters outside the ranges shown in TABLE 6-2. This could lead to false readings on the (physical and graphic) pendant LEDs, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

CLEANING AND DISINFECTION

WARNING *— Unplug the power cord before cleaning the table if cleaning liquids will be used near the power cord receptacle. Under no circumstances should steam or extremely hot water (over 150°F/66°C) be used to disinfect or clean the table. Elevated temperatures and high humidity will weaken the hydraulic lines and result in failure of the hydraulic system and increased leakage currents. Do not clean this table in automatic cart washing equipment. Use of high-pressure water guns could lead to an electrical malfunction and must be avoided.*

CAUTION *— Failure to thoroughly dry the surface after cleaning may result in rust.*

WARNING LABELS

FIGURE S-2 shows the patient safety warning label attached to the table. The label is located on the base at the foot end.

⚠ WARNING
GENERAL PATIENT SAFEGUARDS
• BEFORE USING THE SURGICAL TABLE READ AND THOROUGHLY UNDERSTAND ITS OPERATOR MANUAL P/N 70-000-0026
• HEALTH CARE PROFESSIONALS MUST INSURE PATIENT IS PROPERLY POSITIONED AND MONITORED TO PROTECT PATIENT.
• PROTECT PATIENTS FROM PINCH POINTS. REFER TO OPERATOR MANUAL P/N 70-000-0026 FOR SPECIFIC PINCH POINT LOCATIONS.
• INSTALL AND TIGHTEN ALL ACCESSORIES ACCORDING TO INSTRUCTIONS. DO NOT USE DAMAGED OR WORN ACCESSORIES.
TIPPING HAZARD AND SAFE WORKING LOAD
• DO NOT PLACE PATIENT ON TABLE UNLESS FLOOR LOCKS ARE ENGAGED.
• DO NOT TRANSPORT A PATIENT OVER A LONG DISTANCE WHILE ON TABLE.
• SEE OPERATOR MANUAL 70-000-0026 FOR INSTRUCTIONS ON SAFELY MOVING TABLE WITH PATIENT.
• DO NOT EXCEED 600 LB. (225 KG) FOR "NORMAL" OR "REVERSE" ORIENTATION. SEE SPECIFIC TABLE SET-UP INSTRUCTIONS IN OPERATOR MANUAL P/N 70-000-0026.
• DO NOT EXCEED 400 LB. WITH BEACH CHAIR ACCESSORY.
• DO NOT EXCEED 300 LB. WITH FRACTURE ATTACHMENT UNIT.
• CAUTION: DAMAGE TO TABLE IS POSSIBLE IF TABLE BASE USED FOR ACCESSORY STORAGE. CAUTION: LEG SECTION MAY CONTACT TABLE BASE IN LOWERED POSITION. REMOVE LEG SECTION TO PREVENT DAMAGE.
EXPLOSION HAZARD
DO NOT OPERATE THE TABLE IN THE PRESENCE OF FLAMMABLE ANESTHETICS.

Drawing 306651 Rev. 1

FIGURE S-2 PATIENT SAFETY WARNING LABEL

WARNING — Always replace fuses with fuses of the same voltage and current rating. Failure to use the correct fuse could cause a fire and injury to the patient or OR personnel.

FIGURE S-3 shows the product information label attached to the top of the column on the head side of the table. The product information label also contains fuse replacement information.

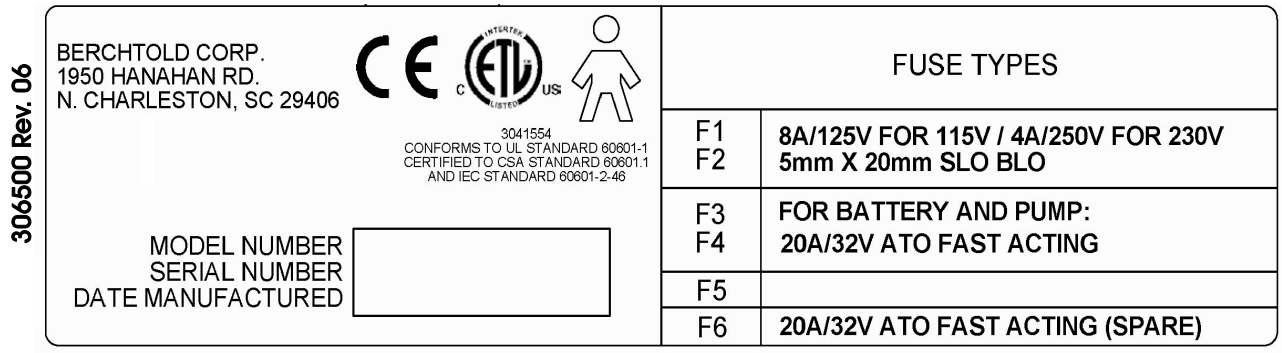

306500 Rev. 06
BERCHTOLD CORP.
1950 HANAHAN RD.
N. CHARLESTON, SC 29406
3041554
CONFORMS TO UL STANDARD 60601-1
CERTIFIED TO CSA STANDARD 60601.1
AND IEC STANDARD 60601-2-46
MODEL NUMBER
SERIAL NUMBER
DATE MANUFACTURED
FUSE TYPES
F1 F2 8A/125V FOR 115V / 4A/250V FOR 230V 5mm X 20mm SLO BLO
F3 F4 FOR BATTERY AND PUMP: 20A/32V ATO FAST ACTING
F5
F6 20A/32V ATO FAST ACTING (SPARE)

FIGURE S-3 FUSE LABEL

GENERAL INFORMATION

GENERAL DESCRIPTION

The Berchtold **OPERON B 810** surgical table is a remote controlled, full-function design offering a high level of patient positioning and imaging flexibility to the surgical team. The table can be activated by AC power through the power cord (input range of 115V ±10%) or by battery power, which requires no power cord except when charging the batteries.

An electric motor with a belt driven screw is used to slide the table top head to foot.

Hydraulic cylinders are used to articulate the table's sections. Hydraulic pressure is provided by a motor driven pump during normal use, and by a manual foot pump in manual back-up mode.

A hand-held control pendant is used to control table positions.

The tabletop is divided into the following sections (FIGURE 1-1):

- Headrest
- Back Section
- Kidney Elevator
- Seat Section
- Leg Section

A leg extension can be added to extend the tabletop surface.

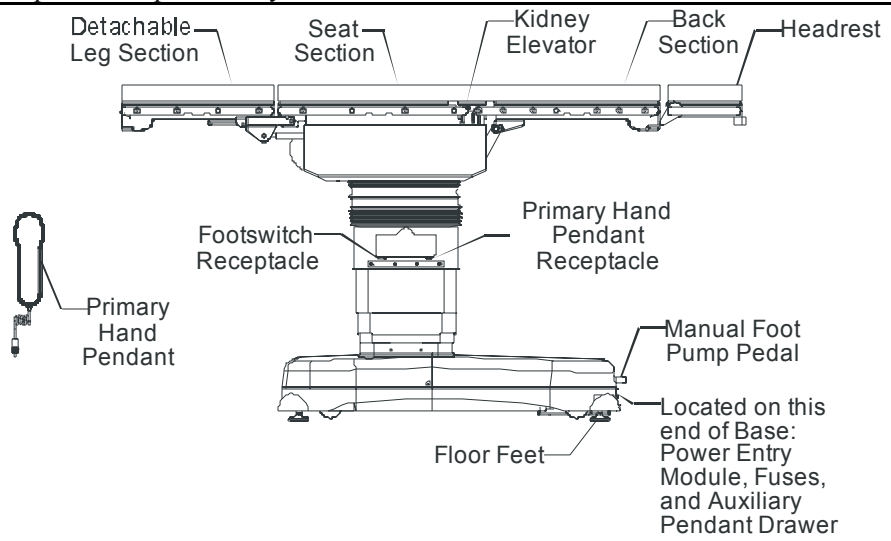


FIGURE 1-1 OPERON B 810 SURGICAL TABLE

RADIOLUCENT TABLE TOP AND PADS

CAUTION *— The anti-static properties of the table depend on the use of the recommended mattress. Compromise of the anti-static properties could expose the patient or OR personnel to an electrostatic shock. It could also deliver a shock to the table's electronics that could damage or destroy critical components.*

The tabletop surface is made from electrically conductive radiolucent panels. The table is fitted with a matching set of conductive radiolucent pads. Velcro tape holds the pads in place.

CAUTION *— Protect the top and bottom surfaces from nicks and scratches. Scratches more than 0.005 inches (127 microns) deep may appear on x-rays. Damaged or scratched panels should be replaced if x-ray quality is affected.*

Each table section has a cassette channel that can accommodate x-ray cassettes up to 14" x 17" (356 x 432 mm).

INTERCHANGEABLE HEADREST

The tabletop has perineal cutouts in both seat and back sections. The back/seat pad can be reversed to expose the desired cutout. The headrest can be interchanged to allow for normal and reversed patient orientation.

POWER SUPPLY

WARNING *— Repeated breaker tripping or fuse replacement may indicate a ground fault or overload condition. The table will not operate reliably under these conditions, and may be electrically unsafe. Do not use the table until these conditions are corrected.*

NOTE *— Recharge the batteries as indicated by the battery indicator on the control pendant. For longevity, it is good practice to charge the batteries at least once a week*

The locations of the primary Power Supply components are shown in FIGURE 1-2.

When the table is plugged into a 120VAC receptacle, it is powered by AC (mains). When the power cord is not plugged in, the batteries provide power to the table. In either case, the ON/OFF switch on the base must be ON to articulate any table sections. When the ON/OFF switch on the base is OFF, the table's electronics and pump motor are isolated from the power supply and the batteries, regardless of the pendant used.

When the charge indicator lamp near the power cord receptacle is lit, the table senses AC power and activates the battery charging system. If AC is present, the battery charging system is activated whether the ON/OFF switch on the base is in the ON or OFF position. The table can remain plugged into AC indefinitely without damaging the batteries. The battery indicator on the primary hand pendant displays the battery charge status. This display has three sections: green (full charge), yellow (low charge) and red (recharge). Only one color will be activated at a time.

NOTE *— In the unlikely event of a control pendant failure, the table movements can be stopped by switching the breaker on the base to the off (down) position.*

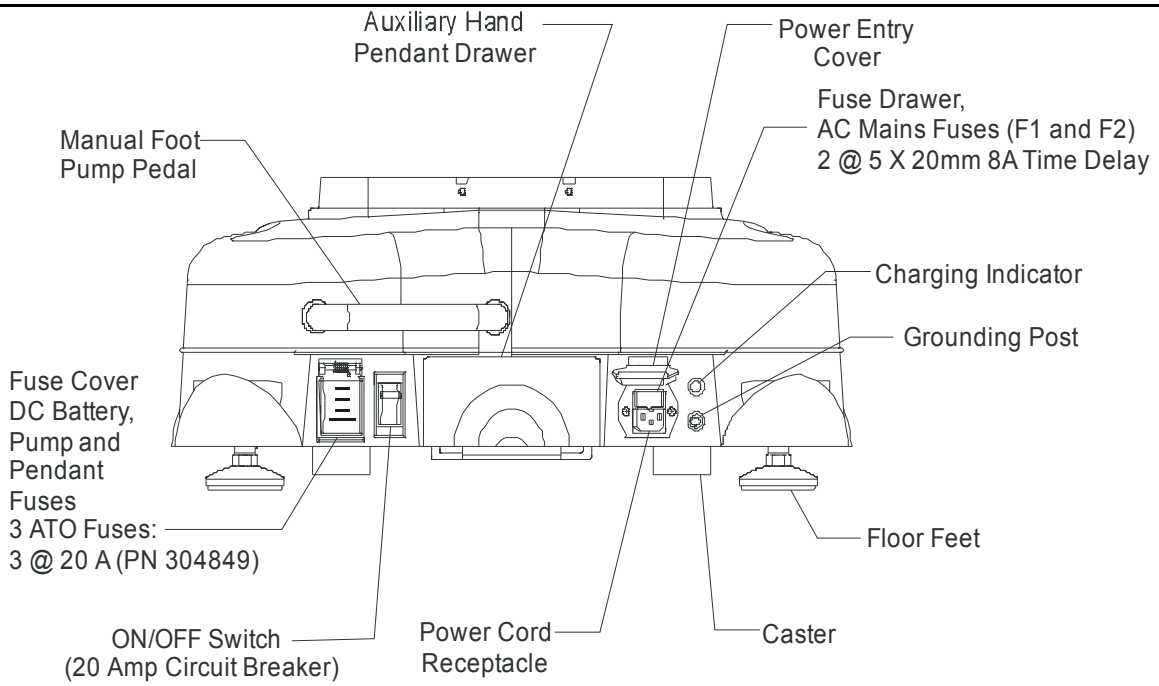

Auxiliary Hand Pendant Drawer
Power Entry Cover
Fuse Drawer, AC Mains Fuses (F1 and F2) 2 @ 5 X 20mm 8A Time Delay
Manual Foot Pump Pedal
Charging Indicator
Grounding Post
Fuse Cover DC Battery, Pump and Pendant Fuses 3 ATO Fuses: 3 @ 20 A (PN 304849)
Floor Feet
ON/OFF Switch (20 Amp Circuit Breaker)
Power Cord Receptacle
Caster

FIGURE 1-2 BASE COMPONENTS

FUSES

Two sets of fuses are accessible without removing the base covers.

The first set, located within the receptacle for the power cord, contains two fuses labeled F1 and F2. These fuses protect against current surges in the AC (mains) line.

The second set, located behind the hinged door next to the ON/OFF switch, contains three fuses. Two of these fuses protect against surges in the DC circuitry; one fuse serves as a spare. Fuses F3 and F4 are 20 Amp rated.

In addition to the fuses, the ON/OFF switch serves as a circuit breaker with a 20 Amp rating.

See FIGURE 1-2 for the fuse locations. See FIGURE 1-3 for the product identification and fuse information label

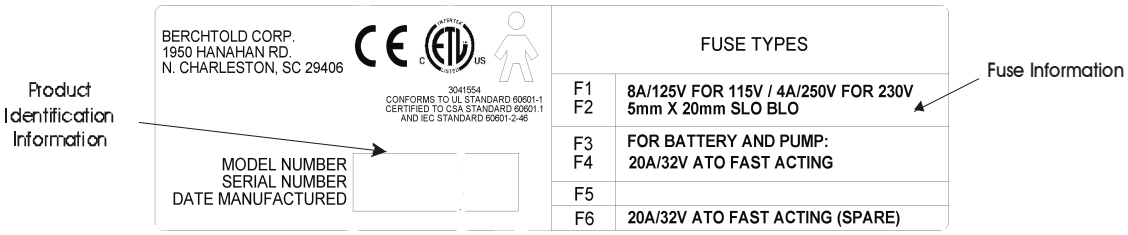

BERCHTOLD CORP.
1950 HANAHAN RD.
N. CHARLESTON, SC 29406
3041554
CONFORMS TO UL STANDARD 60601-1
CERTIFIED TO CSA STANDARD 60601.1
AND IEC STANDARD 60601-2-46
Product Identification Information
MODEL NUMBER
SERIAL NUMBER
DATE MANUFACTURED
FUSE TYPES
F1 F2 8A/125V FOR 115V / 4A/250V FOR 230V 5mm X 20mm SLO BLO
F3 F4 FOR BATTERY AND PUMP: 20A/32V ATO FAST ACTING
F5
F6 20A/32V ATO FAST ACTING (SPARE)
Fuse Information

FIGURE 1-3 PRODUCT IDENTIFICATION AND FUSE INFORMATION LABEL

Two in-line 250V/0.6A fuses protect various components on the AC line. One fuse, located near the head side of the column protects the CPU from power surges (FIGURE 4-41). The second fuse, located on the right side of the column, is in the line between the AC mains and the transformer. One spare fuse is included inside the base cover.

FLOOR LOCK SYSTEM

Four self-stabilizing floor feet compensate up to 0.25" (6 mm) for unlevel floors. The floor feet can be lowered (locked) or raised (unlocked) using the control pendant. When the floor feet are raised, the table rests on four non-conductive casters.

PRIMARY HAND PENDANT

A primary hand pendant controls all table functions. The floor feet must be locked by activating the FLOOR LOCK function to operate any other pendant functions. This ensures that the table base will not move while the tabletop is articulating.

The primary hand pendant plugs into the right side of the remote control connector box, which is located on the left side of the table (FIGURE 1-4). Insert the pendant so the red dot on the connector aligns with a red dot on the socket in the Primary Hand Pendant Connector Box.

NOTE

***NOTE** — The ON/OFF function on the control pendant can be used to stop the table while in motion.*

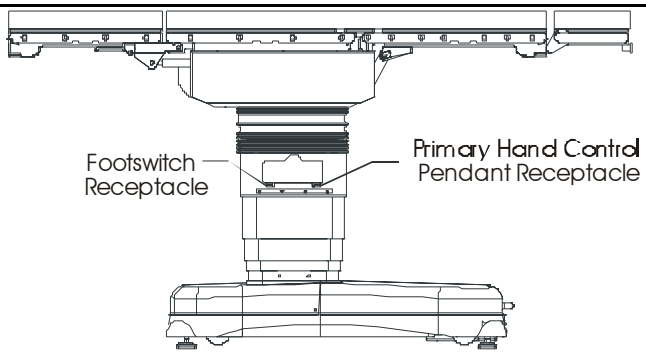


FIGURE 1-4 PRIMARY HAND PENDANT AND FOOTSWITCH CONNECTOR BOX

Primary Hand Pendant Indicators

See FIGURE 1-5 for the location of the indicators

1. **Aux. Pendant** (amber) — Auxiliary hand pendant is active. The primary hand pendant will still be enabled if the auxiliary hand pendant is active.
2. **SERVICE** (red) — Table malfunction. It is likely that most of the functions still work properly and can still be controlled from the primary hand pendant. If the control pendant is not working, use the auxiliary hand pendant and the manual foot pump (if necessary) to articulate the table until the malfunction can be repaired.

NOTE

***NOTE** — If the SERVICE indicator lights, call your local Berchtold Corporation Service Representative.*

3. **REVERSE** (amber) — Indicates reverse orientation of controls.
4. **FLOOR UNLOCK** — Floor feet are raised so table is mobile.
5. **FLOOR LOCK** — Floor feet are lowered so table is locked in place.
6. **BATTERY** — LEDs indicate the charge status of the batteries:
   - Green — Full to medium charge. Normal Operation.
   - Yellow — Low charge. Table still operates normally, but batteries should be charged at the first opportunity.
   - Red (steady) — Recharge battery. Pump motor is shut off and manual foot pump must be used.
   - Red (flashing) — Auxiliary pendant must be used. Recharge battery immediately!
7. **ON** ⊙ (Backlight) — Control pendant is active.

NOTE

***NOTE** — In the event of a primary hand pendant failure, use the auxiliary hand pendant and foot pump to complete the procedure and contact your local Berchtold Corporation Service Representative.*

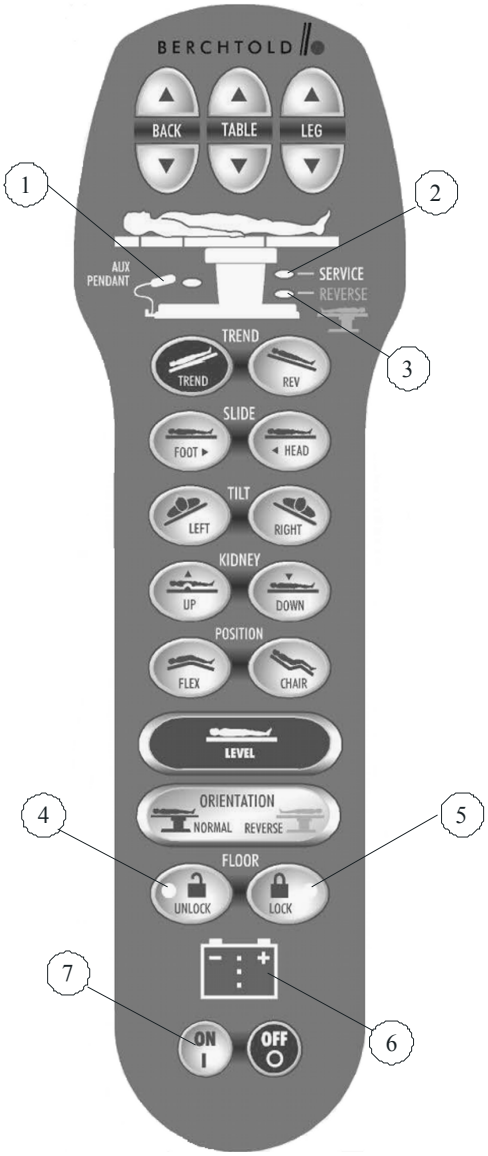


FIGURE 1-5 PRIMARY HAND PENDANT INDICATORS

Primary Hand Pendant Functions

WARNING *— The primary hand pendant is configured for normal patient orientation. If the patient is reversed, the back function must be used to raise or lower the patient's legs and the leg function must be used to raise or lower the patient's back. Trendelenburg, tilt and slide functions are also reversed if the patient is in reverse orientation.*

1. **BACK** ⬍ — Raises and lowers the back section.
2. **TABLE** ⬍ — Raises and lowers the entire tabletop.
3. **LEG** ⬍ — Raises and lowers the leg section.
4. **TREND/REV TREND** (Trendelenburg) — Tilts the entire tabletop about the transverse axis.
5. **SLIDE FOOT/SLIDE HEAD** — Slides the table top toward and away from the head.
6. **TILT LEFT/TILT RIGHT** — Tilts the entire tabletop about the head to foot axis.
7. **UP KIDNEY/DOWN KIDNEY** — Raises and lowers the kidney elevator.
8. **FLEX** — Combines back down with reverse Trendelenburg to form an inverted V (jackknife position).
9. **CHAIR** – Combines back up, Trendelenburg, and leg down functions to form a chair-like support. The three functions operate in a repeating sequence until the back section reaches 80° relative to the seat section and the leg sections reach 105° degrees relative to the seat section.
10. **LEVEL** — Moves the table to a horizontal position that is within 1 degree of level. This function should be used prior to the Flex and Chair Functions.
11. **ORIENTATION NORMAL/REVERSE** — In REVERSE mode, the buttons function in reverse. CHAIR is disabled in Reverse Orientation. Table up/down, floor lock/unlock, and kidney up/down are not reversed.
12. **FLOOR UNLOCK / LOCK** — Raises (unlocks) or lowers (locks) the floor feet.

NOTE: — The power switch on the base of the table must be in the ON position before the hand pendant will operate.

13. **ON/OFF** — Turns the primary hand pendant on and off. The pendant will be backlit when activated.

NOTE *— If AC power is not present, the auto-shutdown feature will turn the control pendant off after about 120 minutes of non-use. To reactivate the pendant, press any function button. If AC is present, the auto-shutdown feature is disabled, and the hand pendant remains on until it is turned off.*

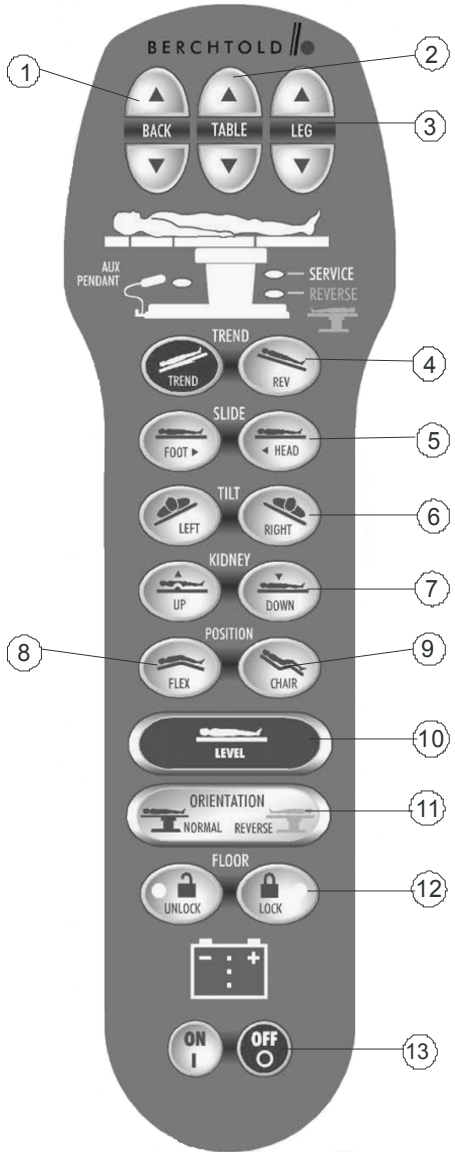


FIGURE 1-6 PRIMARY HAND PENDANT FUNCTIONS

FOOTSWITCH (OPTIONAL)

A footswitch control is available for procedures where the surgeon is normally seated at the pelvic end of the patient (FIGURE 1-7). Footswitch functions include:

- Trendelenburg/Reverse Trendelenburg
- Tilt Left/Tilt Right
- Table Up/Down

The footswitch is connected into the remote control connector box by aligning the red dot on the footswitch connector with the red dot on the socket in the remote control connector box. See FIGURE 1-4 for location of connector.

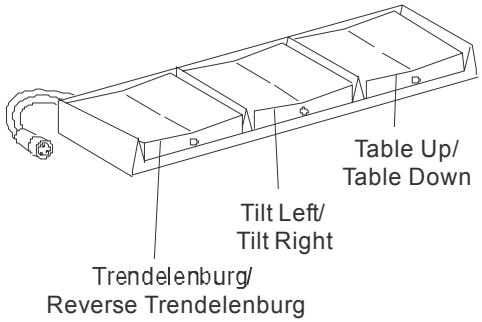


FIGURE 1-7 FOOTSWITCH

Pressing one of the footswitch controls turns the table on and places it in "controls active" status. However, none of the functions will operate unless the floor locks are set. The floor locks must be operated through the hand pedant.

MANUAL FOOT PUMP

The manual foot pump is used to provide hydraulic pressure when there is no electric power to operate the hydraulic pump. This could occur due to any of the following conditions:

- Battery power is low as indicated by a steady or flashing red battery light on the hand pendant.
- A combined failure of the battery and AC mains power supplies.
- A failure of the table's hydraulic pump or the electrical system that powers the hydraulic pump.

The manual pump pedal is located at the head end of the base.

To use the manual foot pump:

1. Pull the foot pedal straight out as far as it will go (FIGURE 1-8).

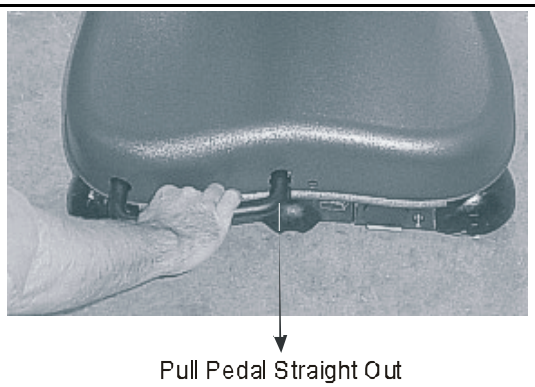


FIGURE 1-8 DEPLOYING FOOT PUMP PEDAL

2. Rotate the pedal clockwise until it can be pulled out farther.
3. Extend the pedal until it snaps into position (FIGURE 1-9).

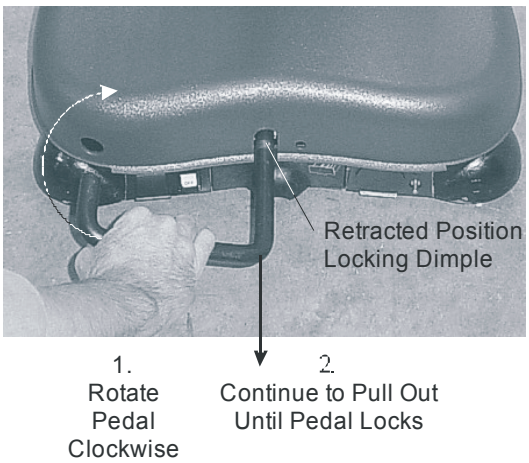


FIGURE 1-9 LOCKING FOOT PUMP PEDAL FOR USE

4. To articulate the table, press and hold the desired function button on the auxiliary control pendant (see next section) and operate the manual pump with your foot. For best results, depress the pump pedal completely, making full strokes, at the rate of about one stroke per second.

To re-insert the pump pedal:

1. Push the pedal back into the table until the end is close to the base cover.
2. Rotate the pedal counterclockwise until the end aligns with the hole in the base cover.
3. Continue to push the pedal into the table until it snaps into the retracted position.

AUXILIARY HAND PENDANT

The yellow auxiliary hand pendant (FIGURE 1-10) is located in the auxiliary hand pendant control drawer in the head end of the base (FIGURE 1-11).

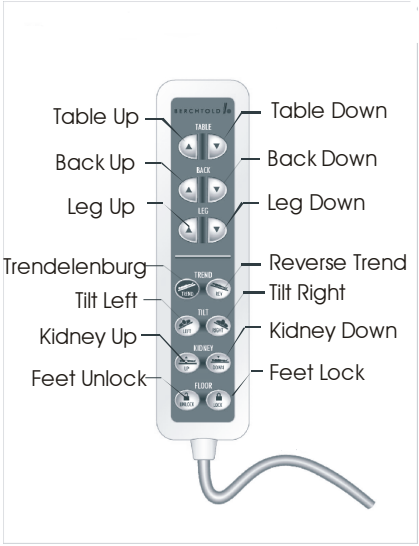


FIGURE 1-10 AUXILIARY HAND PENDANT

Use the auxiliary control pendant when:

- The primary hand pendant will not function.
- The batteries are nearly discharged, AC power is not available, and the table must be mobilized.

WARNING

WARNING *— The auxiliary hand pendant is configured for normal patient orientation. If the patient is reversed, the Back function must be used to raise or lower the patient's legs and the Leg function must be used to raise or lower the patient's back. Trendelenburg, tilt and slide functions are also reversed with respect to the patient's orientation.*

WARNING

WARNING *— The auxiliary hand pendant functions will operate regardless of whether the floor feet are locked or unlocked. If the floor feet are unlocked, the table may roll when the manual pump is operated.*

CAUTION

CAUTION *— The auxiliary hand pendant does not have the following functions: FLEX, CHAIR, RETURN TO LEVEL, and SLIDE. This pendant is intended to be used for completing procedures, followed by charging the batteries or servicing the table.*

NOTE

NOTE *— Activating the Feet Lock function with the auxiliary hand pendant and foot pump will require a large number of pumps to engage the locking feet.*

AUXILIARY PENDANT DRAWER

Do this to use the auxiliary control pendant:

1. Pull the finger tab to open the door and slide the pendant out (FIGURE 1-11).
   - Removing the pendant activates a switch that turns the auxiliary pendant on.
   - Activating the auxiliary hand pendant does NOT disable the primary hand pendant.

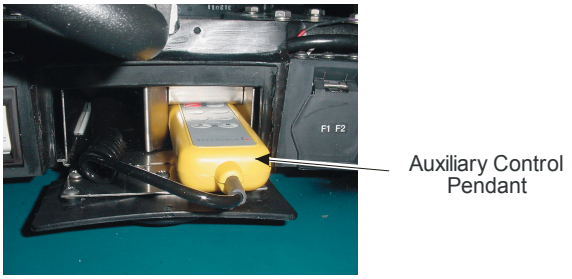


FIGURE 1-11 LOCATION OF AUXILIARY PENDANT

2. Press and hold the desired function button.
3. Operate the manual foot pump until the table top is in the desired position.

NOTE

NOTE *— Cord and auxiliary hand pendant should be placed in separate compartments as labeled..*

When the procedure is complete, do this to stow the auxiliary hand pendant:

1. Carefully fit it and the cord into the compartment.
2. Close the door firmly.
3. If deployed, stow the foot pump handle.

TABLE 1-1. TECHNICAL DATA	
Electrical Power Requirements:	115 V AC +/-10% 50/60 Hz, 6A, Single-phase.
Environmental and Storage Requirements:	
Operation	Ambient temperature range of 50 to 100° F (10 to 38° C), relative humidity range of 10% to 95%, at altitudes from sea level to 8000 ft.
Transport and Storage	Ambient temperature range of –30 to +150° F (-34 to 66° C) relative humidity range of 0% to 95% at altitudes from sea level to 50,000 ft.
Table Top	Radiolucent and conductive carbon fiber panels conform to 21 CFR Subchapter J, Radiation Control for Health and Safety Act of 1968.
Dimensions:	
Length	76 inches (1930 mm)
Width	21 inches (533 mm); excluding the side rails.
Weight	Approximately 715 lbs. (325 kg)
Height	28 to 48 inches (711 mm to 1219 mm)
Head Section	9” X 21”
Back Section	20.0” X 21”
Seat Section	20.5” X 21”
Kidney Elevator	3” X 21”
Leg Section	18.5” X 21”
Range of Motion:	
Trendelenburg	Up to 30°
Reverse Trendelenburg	Up to 30°
Lateral Tilt	Up to 20° right or left
Back Section	From 45° below horizontal to 80° above horizontal
Kidney Elevator	Extendable up to 3 inches (76 mm)
Leg Section	From 2° above horizontal to 105° below horizontal
Headrest	Adjustable from 90° below horizontal to 90° above horizontal in 15° increments
Longitudinal Slide	12 inches (305mm) total
Flex	225°
Chair	Leg Section 105°, Back Section 80° relative to the Seat Section, which may be up to 30° in the Trendelenburg position.
Load Capacity:	
Lifting and Articulation	600 lbs. (273 kg)

If you need assistance, call Berchtold Technical Service at 800-243-5135.

OPERATING INSTRUCTIONS

PINCH POINTS

WARNING *— Cutting or crushing injury may occur if any part of a patient or staff member is caught in a pinch point when the table is articulated.*

CAUTION *— Damage to the table or object may occur if any foreign object is caught in a table pinch point when the table is articulated.*

Due to the variety of table positions attainable with the **OPERON B 810** table, pinch or crushing points exists (FIGURE 2-1). The OR staff must be trained to ensure that body parts or surgical apparatus are not caught in pinch points when the table is operated.

This list is not all-inclusive, because pinch points can be created by the attachment of accessories. Always ensure that the patient and staff are clear of all pinch points before moving the table or while the table is in motion.

Pinch points include but are not limited to:

1. Kidney elevator to seat top
2. Kidney elevator to seat channels
3. Kidney elevator to back section
4. Headrest to back section
5. Back section link to seat channel
6. Side shields to column shields (in tilt)
7. Column shields to base cover
8. Base to floor
9. Floor feet to base
10. Floor feet to floor
11. Leg section to column shield
12. Leg section to seat section.

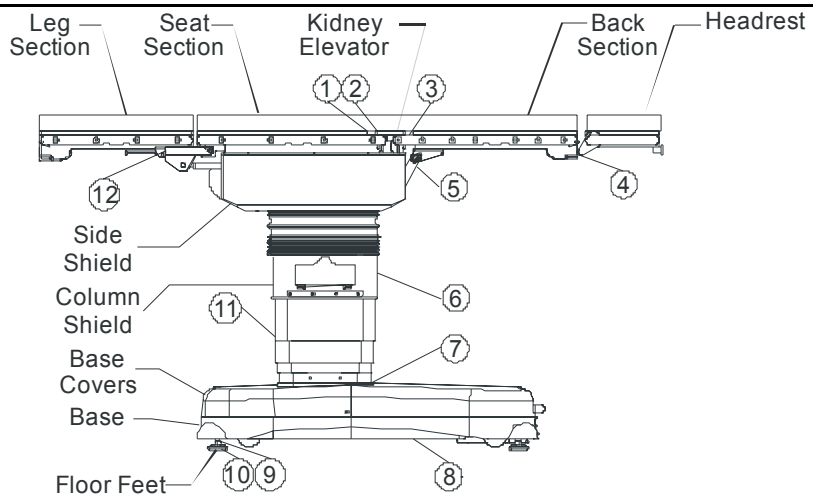


FIGURE 2-1 PINCH POINTS

ELECTROMAGNETIC INTERFERENCE

WARNING *— When using the table in the vicinity of high-frequency surgical equipment, such as cardiac defibrillators and cardiac defibrillator monitors, refer to the equipment manufacturers' instructions to ensure compatibility issues are considered.*

This surgical table has been tested to EN 60601-1-2 to ensure proper electromagnetic compatibility. Other products used in the vicinity of the surgical table should also comply with this standard. If they do not comply, interference between products resulting in unintended responses may occur. Please contact the appropriate manufacturer(s) if any problems arise.

If the integrity of the external protective earth conductor arrangement is in doubt, the surgical table should be operated from its internal electrical power source (batteries) until the situation is corrected. The batteries require charging at least once a week. If the integrity of the external protective earth conductor arrangement is in doubt, and the batteries are not charged, operate the surgical table with the manual foot pump and the auxiliary hand pendant until the situation is corrected.

LOAD CAPACITY

WARNING *— Overloading may result in tipping of the table or failure of the table sections to move. Do not exceed the maximum load.*

The patient lifting and articulation capacity is 600 lbs (273 kg). This means that a 600 lb patient can be moved into any of the standard procedural positions.

PATIENT ORIENTATION

WARNING

WARNING *— Before positioning the table, be sure the correct table orientation is selected as indicated by the NORM or REV indictor on the primary control pendant. Improper orientation will result in reverse functioning and potential patient injury.*

Normal Orientation

Normal Orientation is defined as follows:

- The head end is the end where the manual pump is located.
- The perineal cutout in the seat section is exposed
- Left and right refer to the patients left and right.

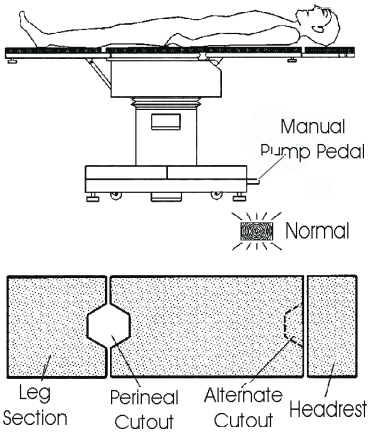


FIGURE 2-2 NORMAL TABLE ORIENTATION

Reverse Orientation

Reverse orientation is defined as follows:

- The head end is opposite the manual pump.
- The back/seat pad is reversed to expose the perineal cutout in the back section.
- The headrest is removed and the optional leg extension or fem-pop board is installed into the back section.
- Left and right refer to the patients left and right.

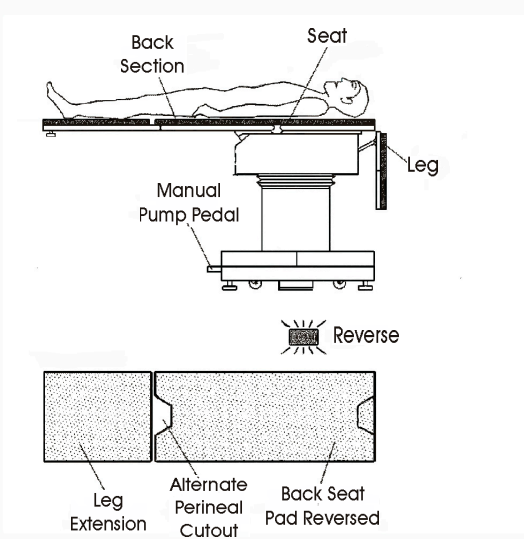


FIGURE 2-3 REVERSE TABLE ORIENTATION

PATIENT POSITIONING

WARNING

WARNING *— POSSIBILITY OF TIPPING: If FULL SLIDE FORWARD IS REQUIRED, the patient's pelvis must always be located over the seat section when in normal orientation. Utilizing full forward slide while the patient's pelvis is on the leg section can impair table stability and result in patient injury or equipment damage.*

When the patient is placed in the Lithotomy position on the seat section, the following precautions must be followed to ensure safety and stability:

- The table must be securely locked to the floor and not mobilized while the patient is in this position.

WARNING

WARNING *— The leg section may be removed from the table. If it is left on the table, use caution when raising the leg section while the patient is in the normal perineal position.*

NOTE

NOTE: *— The tabletop may be slid towards the foot end of the table (full slide forward) without compromising stability.*

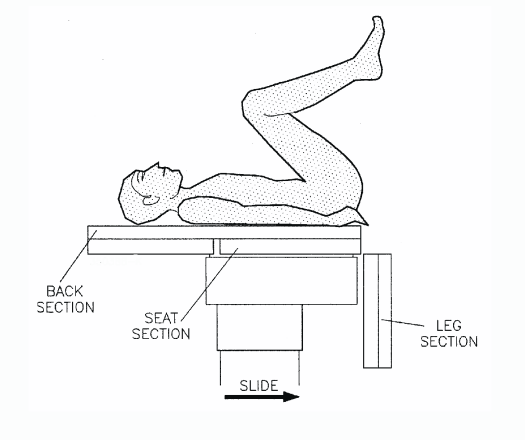


FIGURE 2-4 NORMAL PERINEAL POSITION

For OB/GYN, cystoscopy, and endo/urology procedures using a C-Arm, the patient may be reversed with the pelvis positioned on the back section over the alternate perineal cutout.

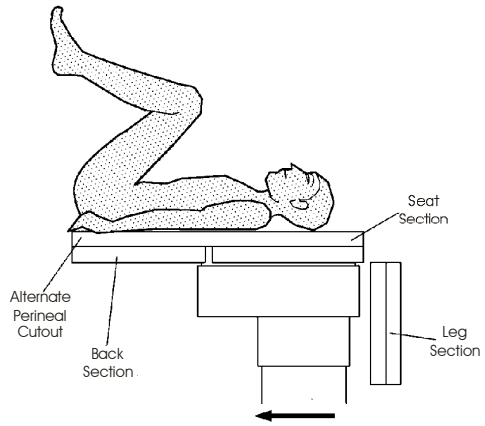


FIGURE 2-5 REVERSE PERINEAL POSITION

The table must be securely locked to the floor and not mobilized while the patient is in this position.

NOTE

NOTE: *— The tabletop may be slid towards the head end of the table (full slide reverse) without compromising stability.*

TABLE MOVEMENT WITH PATIENT

WARNING

WARNING *— If the table needs to be moved with a patient on the table, it is very important to follow the following instructions to prevent patient injury or equipment damage.*

WARNING

WARNING *— The table should not be used to transport a patient over a long distance. This procedure is only meant for repositioning the table in the surgical suite.*

Certain ENT, Neuro, and Ortho procedures require that the table be moved after anesthetizing the patient. If this is required, the following steps must be followed:

- **Be sure that the patient is properly secured to the table with straps.**
- **Center the patient over the main lift column.**
- **Lower the table to its lowest point.**
- **Check the floor for and remove objects that may interfere with moving the table, such as power cords or table accessories.**
- **Have at least one person at each end of the table.**
- **Unlock the table.**
- **When moving the table, the people at each end must use a lateral force in the direction of motion; do not lift up on a section or push down on a section.**
- **Immediately lock the table when the new location is reached.**

OPERATION

CAUTION

CAUTION *— Storage of clamps, accessories, etc., on the base cover may result in damage to lift column shields and prevent proper elevation or descent of the table.*

NOTE

NOTE *— The table can be operated with or without the power cord connected to the mains inlet receptacle. Plug in the power cord if the batteries need recharging. The table may be operated while the batteries are charging.*

If desired, plug the table's power cord into a mains power source. When the table is plugged in via the power cord, it is powered by mains AC. When the power cord is not plugged in, the batteries provide power to the table. In either case, the ON/OFF switch on the base must be ON to articulate any table sections. When the ON/OFF switch on the base is OFF, the table's electronics and pump motor are isolated from the power supply and the batteries.

When the charge indicator lamp near the power cord receptacle is lit, the table senses mains AC and activates the battery charging system. Battery

charging will occur whether the ON/OFF switch on the base is in the ON or OFF position. The table can remain plugged into AC indefinitely without damaging the batteries.

HAND PENDANT OPERATION

The table may be activated by pressing the hand pendant ON button or by pressing any of the hand pendant function buttons.

If you activate the table by pressing the ON button, the hand pendant LEDs for the SERVICE, LOCK/UNLOCK, and all Battery levels will illuminate briefly. This is a self-test function.

If there is a problem with the hand pendant, the connection to the table, or any of the table functions, the SERVICE LED will remain on.

If there are no problems, all LEDs except the current floor lock and battery status displays will turn off, and the function buttons will become back lit to indicate that the table is in a "controls active" status (FIGURE 2-6).

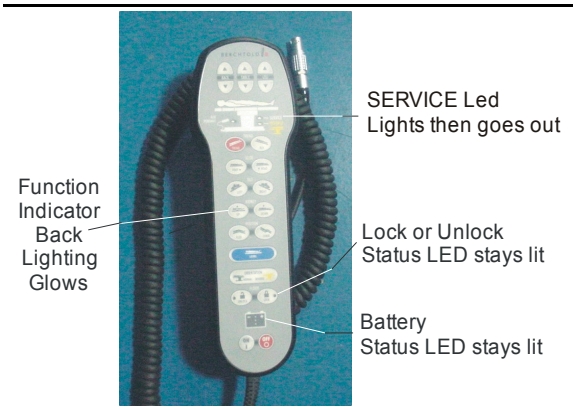


FIGURE 2-6 HAND PENDANT POWER-ON INDICATORS

To conserve battery power, the hand pendant will automatically go into SLEEP MODE (backlighting will turn off) after two hours of non-use. This period can be changed through the table's Service Software Program, which is described in the "Service Program" section of this manual.

If you activate the hand pendant from the SLEEP MODE by pressing any of the function buttons (other than the ON button), the self-test will be performed after the button is released. To actuate the function associated with the button it must be pressed a second time after "awakening" the hand pendant. If the floor legs are NOT locked, the back lighting will come on and the hand pendant will go into "controls active" status, the feet will automatically descend and lock.

To operate any hand pendant function, press and hold the button for the action desired. If you press the floor lock or unlock function, you do not have to hold the button until the function is complete. Once started, the floor locking or unlocking action will be completed automatically.

Each articulation has a software controlled limit. You can stop any motion by releasing the function button or you can hold the button until it reaches the limit set for that function, and the movement will stop automatically.

1. Press the ON button on the control pendant to activate the control pendant
2. Press FLOOR LOCK to lower the floor feet. The green LOCK indicator on the control pendant will light when the floor feet are locked.
3. Select the desired function by pressing and holding the appropriate function switch.
4. When the desired position has been reached, release the function button to stop movement.
5. After the patient has been transferred from the table, press FLOOR UNLOCK to raise the floor feet and allow table transport. The yellow UNLOCK indicator on the control pendant will light when the floor feet are unlocked.

If the table functions do not operate, check the following:

1. Is the ON/OFF switch on the base of the table in the OFF position?
   - Turn the switch to the ON position.
2. Is the yellow UNLOCK indicator lit?
   - Lock the floor feet.
3. Is the battery status LED red and flashing or steady?
   - Use the manual foot pump or plug in the table. Plugging in the table will allow normal use and also recharge the batteries.
   - Use the auxiliary pendant and foot pump to complete the operation.
4. Is the red SERVICE LED lit?
   - A lit SERVICE LED indicates that service is required, but may not disable a table function or functions, depending on the failure. If a failure occurs that can allow an unsafe operation, the specific function, such as return to level, will be disabled but the other functions will remain enabled. Only a catastrophic failure of the main processor will light the SERVICE LED and disable all table functions. Always contact Berchtold Service if the SERVICE LED is lit.

Function Priority

When a function is selected using either, the primary hand pendant or optional footswitch, the table will stop performing any function that was in progress. To resume the motion, you must release the function (or footswitch) button and press it again.

You can press only one button at a time. If you press more than one button at the same time, neither will work. If you press a second button while one function is operating, the function will stop. To restart the function, you must release the function button and press it again.

Table Movement Limits

Due to the **OPERON B 810** table's extensive articulation range, some functions can not be combined at their maximum capability. These interfering functions are limited in two ways: by the table software and by the user.

Each table movement has a speed limit that is based on a percentage of the hydraulic pump power applied. These speed limits help to ensure smooth table movements and enhance patient safety.

Software-Controlled Limits

The software controls limit the functions described in Table 2-1. If the **Operon B 810** table is positioned according to "Position of Function", the software prevents movement beyond the range specified by "Resulting Function Limit". The user cannot override these limits using the control pendant.

TABLE 2-1. SOFTWARE-CONTROLLED LIMITS

Position of Function	Resulting Function Limit		
Back Section raised over 26°	Kidney elevator cannot be operated		
Any raising of the kidney elevator	Limits Back section to maximum of 26° above horizontal		
Trendelenburg and Reverse Trendelenburg	± 30 ° except:		
	When Tilt Right is:	Max Trend angle is:	Max Reverse Trend angle is:
	0° to 5°	30°	30°
	5.1° to 10°	30°	15°
	10.1° to 20°	22°	15°
	When Tilt Left is:		
	0° to 10°	30°	30°
	10.1° to 20°	22°	22°
	When Leg angle is:		
	>65°	30°	10°
	>90°	30°	Disabled
	When Back down angle is:		
	>30°	15°	30°
	When table Height is:		
	<31”	15°	15°
	31”<Height<40” AND Leg >65°	15°	5°
Tilt Left and Tilt Right	± 20 ° except:		
	When Trend is:	Max Tilt Right is:	Max Tilt Left is:
	0° to 20°	20°	20°
	>20°	10°	10°
	When Rev Trend is		
	0° to 15°	20°	20°
	15° to 22°	5°	20°
	>22°	5°	10°
	When Leg down is		
	>65°	Disabled	Disabled
Back angle	If Height is	Max Back angle is	Min Back angle is
	<31”	80°	30°
Leg angle	+2°, -105° except		
	If Reverse Trend is	Max Leg up angle is	Max Leg down angle is
	>10°	2°	65°
	If table Height is		
	<31”	2°	65°
	If Tilt (right or left) is		
	>5°	2°	65°
	Height < 31” AND Slide is Max Forward (leg end)	2°	97°
Slide	Slide Function is disabled if: Trendelenburg or Reverse Trendelenburg angles >15° Leg Down > 65° AND Height <31”		
Height	If Leg down angle is	Max Height is	Min Height is
	>65°	46”	31”

User-Controlled Limits

***CAUTION** — Watch the table at all times while performing multiple articulations. Stop table movements before collisions occur. Failure to do so could result in damage to the table.*

Some collisions are possible when combining multiple articulations, particularly at low table heights. When combining functions, you must monitor the table's position to ensure collisions are avoided.

HEADREST

***WARNING** — Do not mount knee crutches or leg holders to the headrest side rail. The headrest should only be used for supporting the head or feet. Do not lean on the headrest. The headrest has a weight limit of 25 lbs.*

***WARNING** — When articulating the headrest, be sure that the locking mechanism engages completely, and does not hang in between positions. Until the locking mechanism engages, the headrest may move when a load is applied.*

The table headrest can be latched in any position from 90° above horizontal to 90° below horizontal in 15° increments.

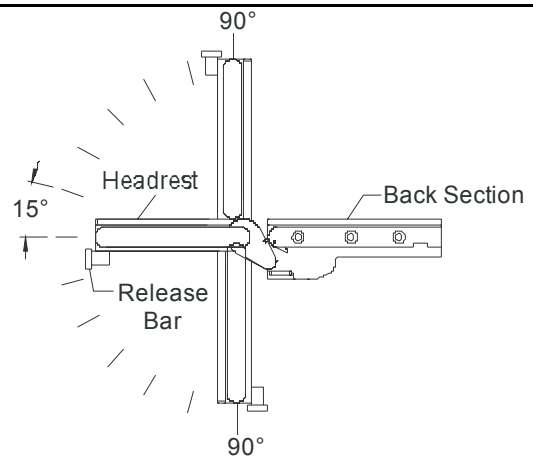


FIGURE 2-7 HEADREST

To raise and lower the headrest:

1. Release the locking mechanism by pulling out the release bar on the right underside of the headrest.
2. When the headrest is properly positioned, release the bar.

***WARNING** — When releasing the locking mechanism, support the headrest, as it will fall freely if the locking mechanism is not engaged.*

REMOVABLE LEG SECTION

WARNING *— Failure to securely lock the leg section into place may result in patient injury. Always check the retention of the leg section upon installation.*

Install the leg section as follows:

1. Using the pendant, activate LEG UP until the leg section pivots are horizontal.
2. To align the leg section for installation, place the leg section posts into the pivots at a –45 degree angle.

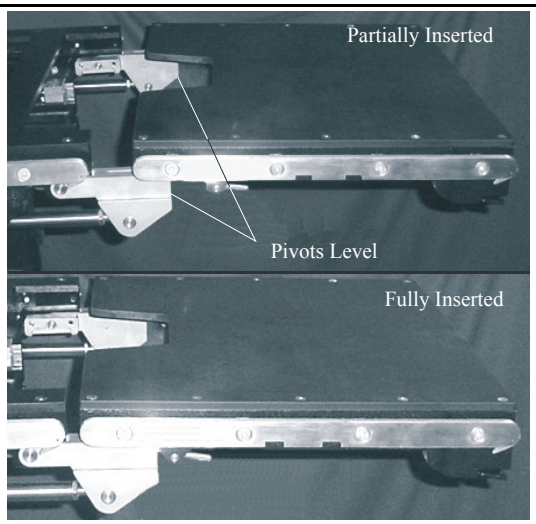


FIGURE 2-8 ALIGNING THE LEG SECTION FOR INSTALLATION

3. Once the leg section is aligned, lift to a horizontal position and insert the leg section into the pivots.
4. Slide the leg section towards the seat section until it comes to a stop and the locks snap into place (FIGURE 2-9 and FIGURE 2-10).

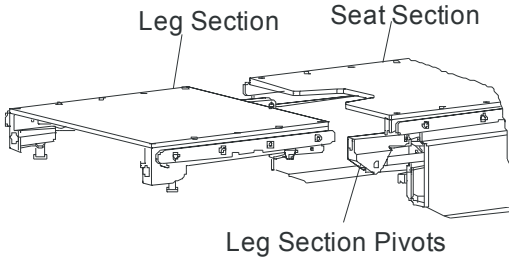


FIGURE 2-9 LEG SECTION

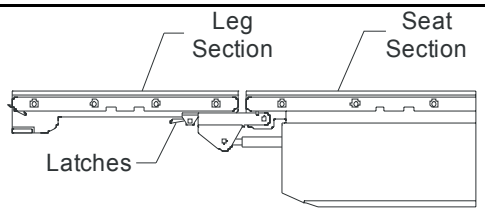


FIGURE 2-10 ASSEMBLED LEG SECTION

5. Attempt to pull the leg section away from the table to make sure that it is retained. If not, push evenly until the locks engage.

To remove the leg section:

1. Bring the leg section to a level position, (i.e., parallel to the floor).
2. Depress the latches to release the locking mechanism and pull back evenly.

FOOTSWITCH (OPTIONAL)

CAUTION *— The Footswitch's electrical connections are resistant to fluid intrusion, but if fluid drainage is anticipated, the footswitch should be protected by wrapping it with a clear disposable footswitch bag. This will reduce the need to disinfect the footswitch.*

NOTE *— to operate the footswitch control, the floor feet must be locked.*

NOTE *— It is not necessary to press the primary hand pendant ON/OFF switch when operating the footswitch control. The primary hand pendant can not be operated simultaneously with the footswitch.*

The footswitch plugs into the left connector on the receptacle box, which is located on the left side of the table. Align the red dot on the footswitch connector with the red dot on the mating connector on the left side of the connector box. (See FIGURE 2-11.)

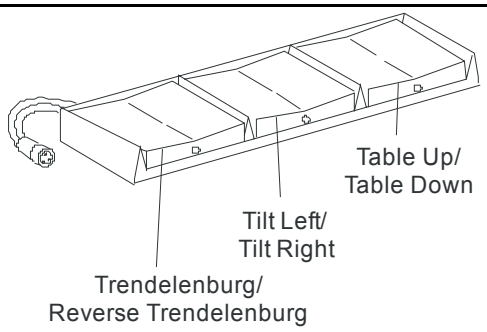


FIGURE 2-11 FOOTSWITCH

NOTE

***NOTE** — To avoid inadvertent actuation, the footswitch should be disconnected for procedures that do not require its use.*

The footswitch will not operate if the red battery indicator is lit, either flashing or steady

To operate the table, select the desired function by pressing the appropriate side of the rocker switch. Pressing the opposite side of the rocker will reverse the direction of travel. Releasing the rocker switch will stop table movement.

BACKUP INSTRUCTIONS

It is highly recommended that all operators become familiar with the following backup instructions and with the operation of the auxiliary hand pendant and manual foot pump before using the table.

FIGURE 3-1 BACKUP SYSTEMS

***NOTE** — When using the auxiliary hand pendant, press and hold the button while operating the foot pump.*

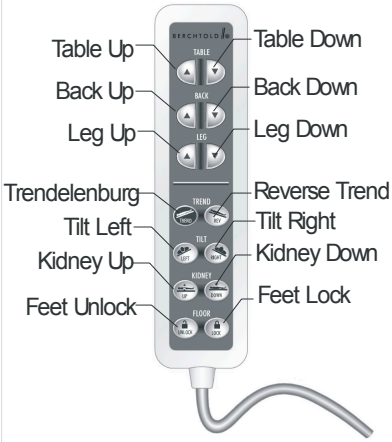


FIGURE 3-2 AUXILIARY HAND PENDANT

PRINCIPLES OF OPERATION

HYDRAULIC SYSTEM

WARNING *– POSSIBILITY OF INJURY: The HYDRAULIC system must be kept free of contamination. Contamination can cause the hydraulic system to fail, resulting in personnel injury or equipment damage.*

CAUTION *– The hydraulic system on the OPERON B 810 surgical table contains micro-hydraulic valves, which are very sensitive to contamination. Only a qualified, trained service technician should open the hydraulic system, and only after all other repair procedures have been tried. Always use clean tools, and cover or wrap any loose hydraulic lines with clean plastic bags.*

CAUTION *— Use only BP Energol HLP-HM 32 (or approved substitute ARAL VITAM DE32) hydraulic fluid. The use of other fluids could damage the hydraulic system.*

NOTE *– See FIGURE 4-6 (floor lock system operation,) FIGURE 4-9 (Column Cylinder Schematic), and Figure 5-1(C8 Hydraulic Schemati), for the hydraulic system schematics.*

Hydraulic Power Unit

A hydraulic pump, driven by an electric motor, is the primary source of hydraulic power. The hydraulic pump has a relief valve set at 2030 psi (140 bar). The operating pressure is dependent on the load on the pump and the flow required. It can vary from 0 to 2030 psi. FIGURE 4-1 shows the power unit mounted on the column. The column is shown without other parts for clarity.

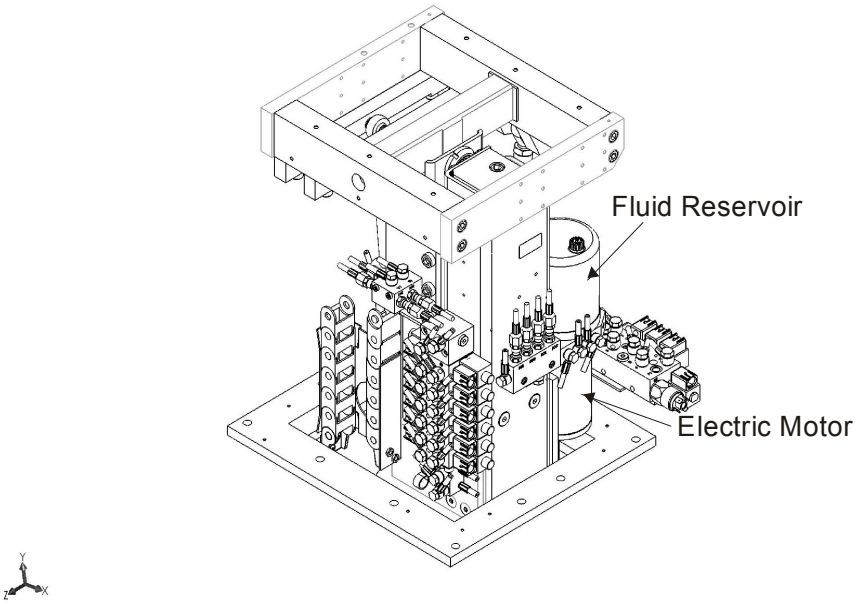


FIGURE 4-1. HYDRAULIC POWER UNIT ON MAIN ELEVATING COLUMN

Hydraulic Manifolds

The table has 2 hydraulic valve manifolds. The manifolds direct hydraulic fluid to the cylinders that move various parts of the table. The manifolds are made up of hydraulic valves that are actuated by 24V (nominal) DC solenoids. The solenoid valves are field replaceable, but certain individual hydraulic components that make up a manifold are not field replaceable.

Each manifold has a 25 micron filter on the input. The column mounted solenoids use a 60 micron filter to keep contamination from entering the solenoid valves between the A and B sides (see Table 4-2). Replacing the filters is not a preventive maintenance task. The filters should be replaced only if the system flow has stopped due to the introduction of large amounts of contamination.

Column Manifold

A manifold on the main lift column provides hydraulic fluid to the following cylinders (FIGURE 4-2):

- Two main lift cylinders
- Trendelenburg cylinder
- Tilt cylinder
- Back cylinders
- Leg cylinders
- Kidney cylinders

Table Top Distribution Block

A distribution block mounted above the column manifold routes hydraulic fluid to the table top Back and Leg cylinders (see FIGURE 4-3).

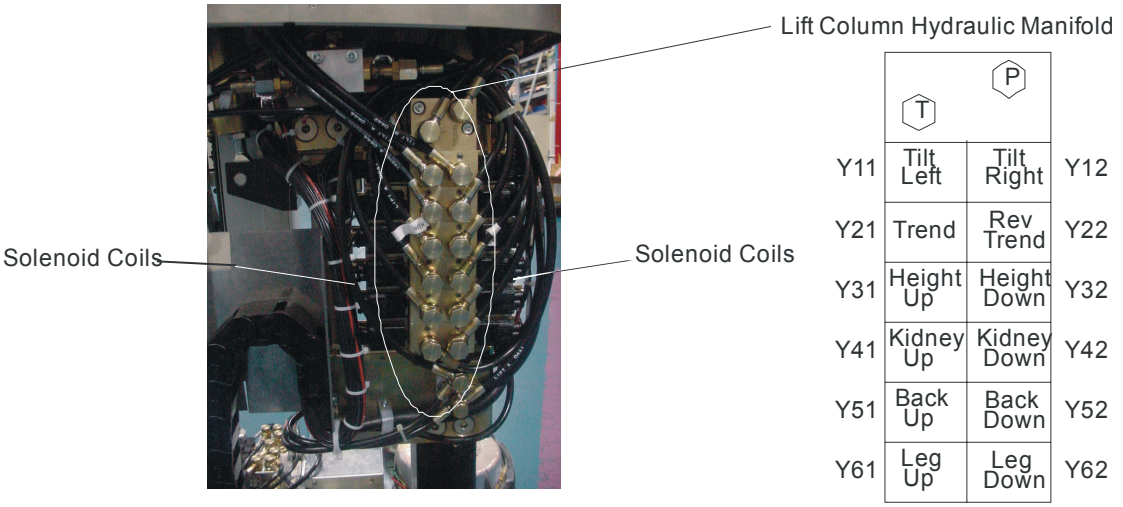


FIGURE 4-2. COLUMN MANIFOLD

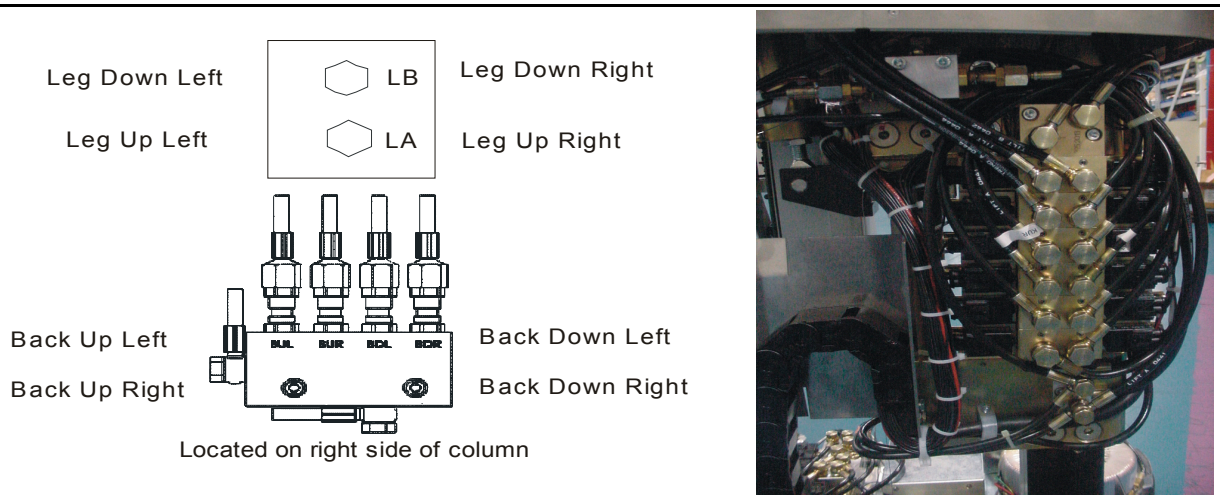


FIGURE 4-3. DISTRIBUTION BLOCK

Quick Disconnects

There are quick disconnect fittings on both leg and back distribution blocks, as well as in the middle of the kidney cross over hose. To disconnect/connect see figure 4-7.

Floor Lock Manifolds

One manifold controls the floor lock system (FIGURE 4-4). Located in the foot left section of the base, the foot lock manifold directs fluid to the individual cylinders that operate the foot jacks (FIGURE 4-5).

The manifold contains no field replaceable parts. It must be replaced as a complete unit.

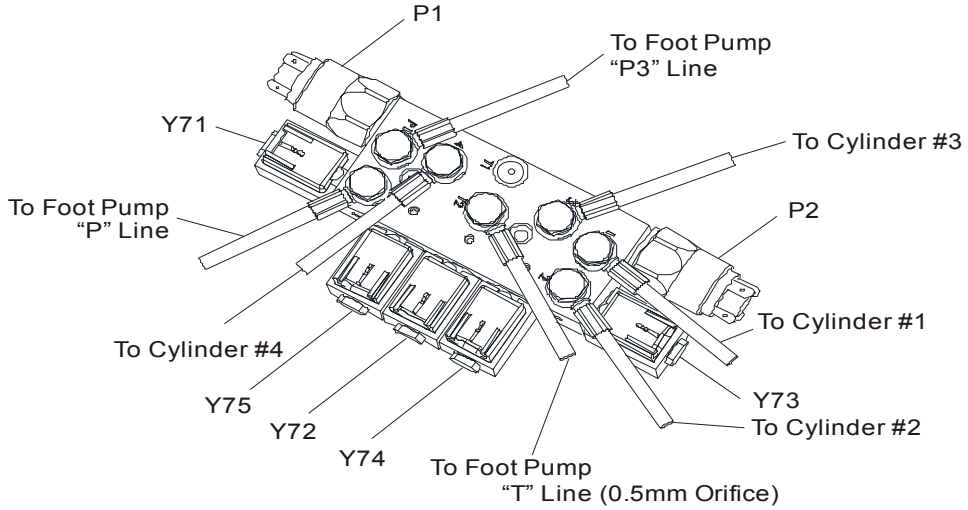


FIGURE 4-4. FLOOR LOCK MANIFOLD

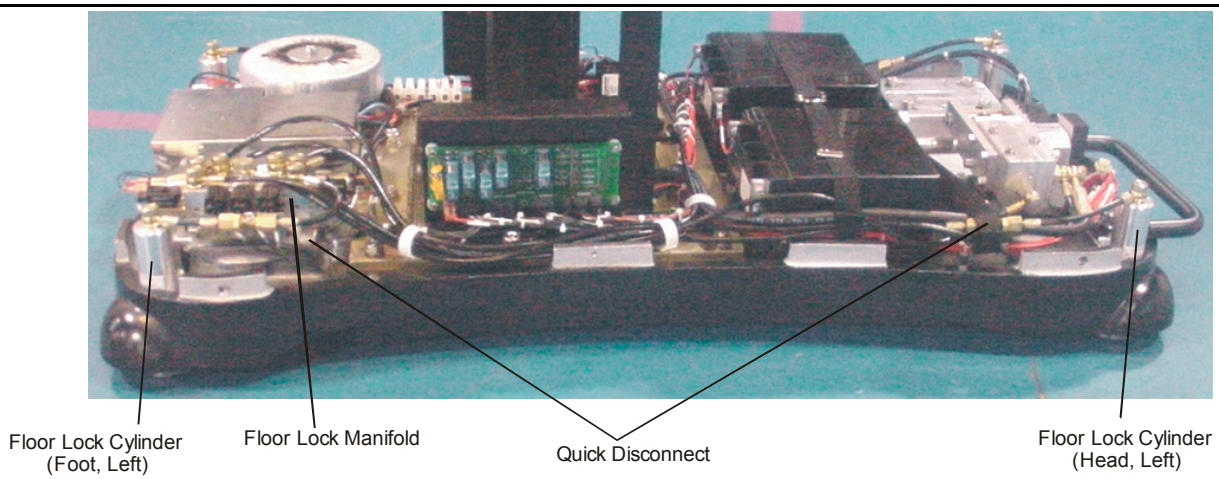


FIGURE 4-5. FOOT LOCK MANIFOLD LOCATION IN BASE

Floor Lock System Operation

The floor lock system uses 4 hydraulic cylinders in parallel as shown in FIGURE 4-6.

The floor lock system can compensate for uneven floors up to 0.25" (6mm). (If the floor is out of level by more than 0.25", an error message may be logged in the CPU.) This is accomplished by using 2 pressure switches to control the fluid flow to the cylinders.

The sequence of events when locking and unlocking the feet is as follows (the table base ON/OFF switch must be ON):

1. Power is applied to pressure switch P2 to tell the controller the status of the feet.
2. The Lock button on the hand pendant is pressed, initiating the pump and pressurizing the manifold.
3. Power is applied to solenoid Y71 and pressure switch P1 via the extension board. LEDs on the extension board will turn on and off to indicate movement of the locks.
4. Fluid flows to cylinders 1 and 2 via the one way check valve in solenoid Y73.
5. Cylinders 1 and 2 move to full stroke. When they reach full stroke, the pressure continues to build until it reaches 1740 psi (120 bar).
6. At 1740 psi (120 bar), pressure switch P1 closes.
7. Solenoids Y74 and Y75 energize and allow fluid to flow to feet 3 and 4 via the extension board.

LEDs on the extension board will turn on and off to indicate movement of the locks.

8. When valves Y74 and Y75 are open, the pressure is the same at feet 3 and 4. If the floor is uneven, the fluid will flow to the foot with the least resistance, which on an uneven floor, is the one that must travel the most distance.
9. When both feet hit the floor, the pressure increases.
10. Pressure switch P2 closes when the pressure reaches 580 psi (40 bar).
11. When P2 closes, a signal is sent to the controller that the feet are locked, illuminating the lock LED on the pendant, and de-energizing the pump and the power to P1, Y74, and Y75.
12. When Unlock is pressed, Y72 is energized, allowing pump pressure to open the pilot valves. Y73 is energized to allow fluid to flow from feet 1 and 2, and fluid flows freely from Y74 and Y75 via their check valves. Springs in each foot push the fluid out, allowing the feet to retract.

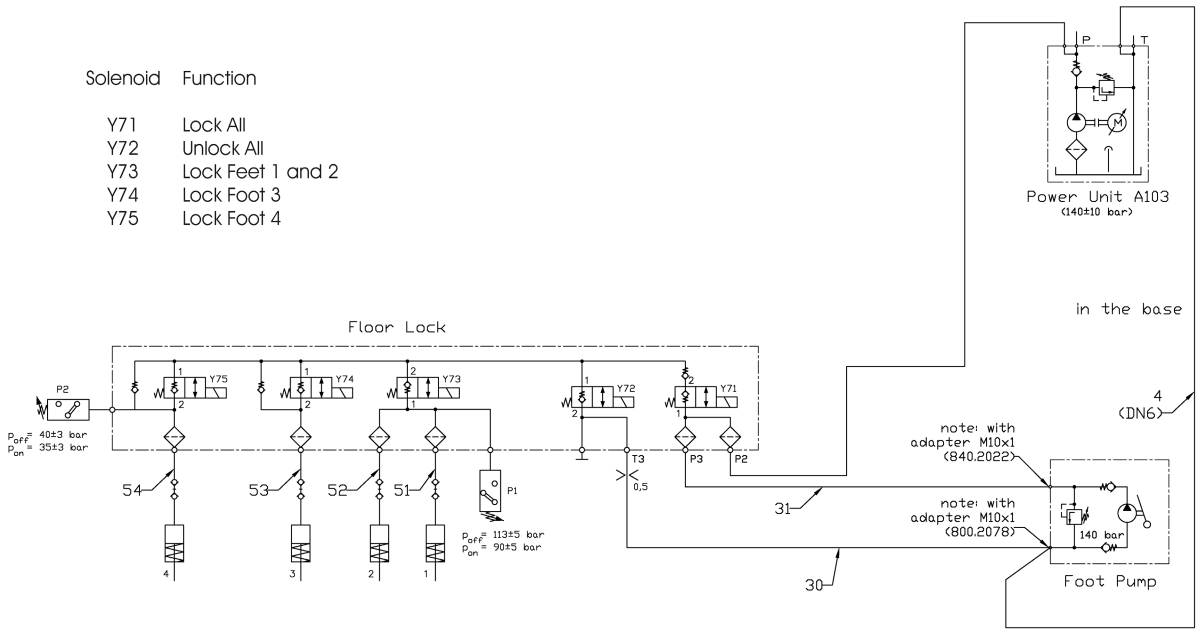


FIGURE 4-6. FLOOR LOCK SYSTEM OPERATION

Floor Lock Quick Disconnect

The floor lock cylinders connect to the hydraulic lines with quick disconnect fittings (FIGURE 4-7). This allows any of the lock cylinders to be removed and replaced without the need to open the floor lock system. Since the quick disconnects preclude air from entering the lines, there is no need to bleed the hydraulic system after disconnecting the lock cylinders. Nevertheless, BERCHTOLD recommends that the floor lock cylinders not be replaced by the end user because of the risk of contamination entering the hydraulic system.

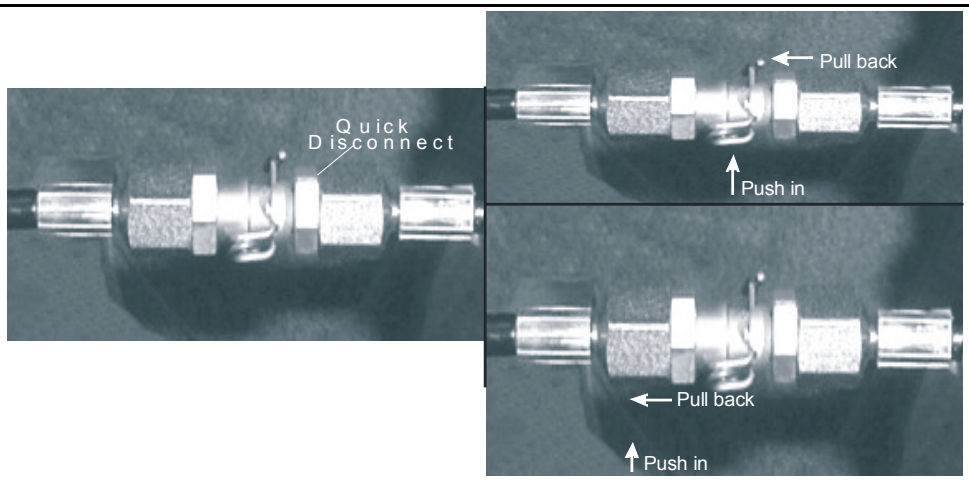


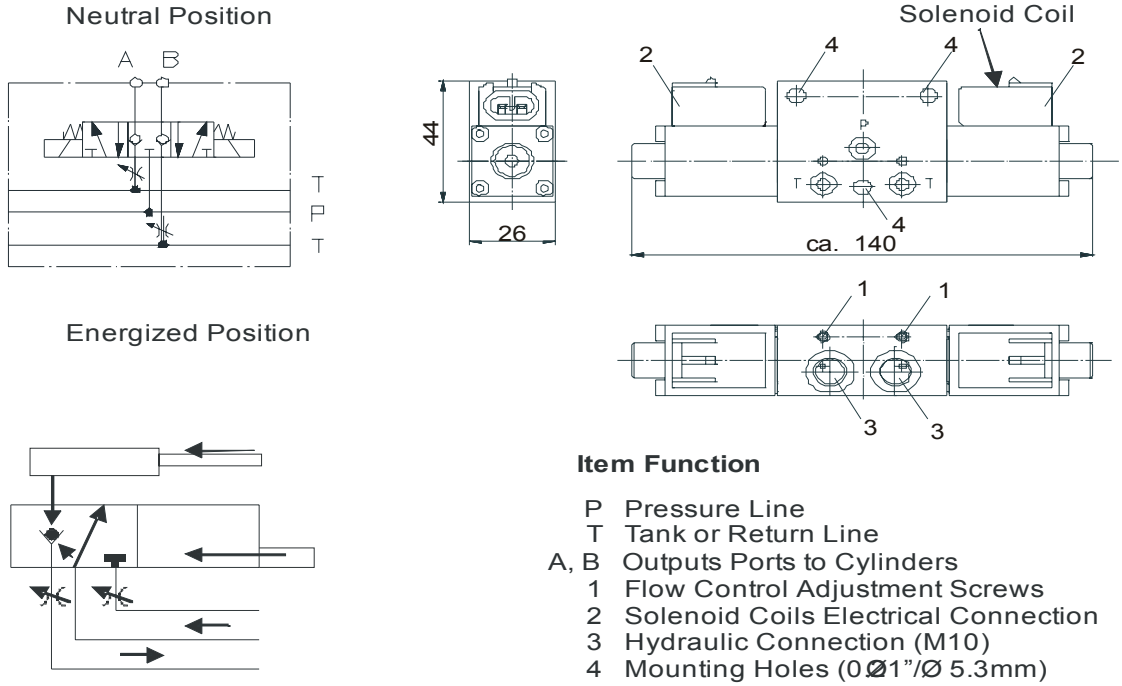
FIGURE 4-7. FLOOR LOCK QUICK DISCONNECT

Manifold Valve Description

FIGURE 4-8 illustrates the valve slice used for all hydraulic manifolds except the foot lock. Table 4-1 describes the operating range for the valves.

The manifold valves are 5/3 way directional control valves with pilot operated check valves and integrated return throttles (A and B). The pilot operated check valves enable the actuator to be stopped and held in position, even under external loading.

Valves are not field replaceable, and they do not contain any field replaceable parts.



Item Function

P	Pressure Line
T	Tank or Return Line
A, B	Outputs Ports to Cylinders
1	Flow Control Adjustment Screws
2	Solenoid Coils Electrical Connection
3	Hydraulic Connection (M10)
4	Mounting Holes (0Ø1"/Ø 5.3mm)

FIGURE 4-8. MANIFOLD VALVE

TABLE 4-1 MANIFOLD VALVE OPERATING SPECIFICATIONS

Parameter	Range
Operating Pressure	Up to 3626 psi (250 bar) depending on flow rate
Flow Rate	61 $in.^3$/min (3 dm^3/min) maximum
Ambient Temperature	-22 °F to +212 °F (-30 °C to +100 °C)
Pressure Medium Temperature	-7 °F to +176 °F (-20 °C to +80 °C)
Pressure Medium	Hydraulic oil per DIN51524 and DIN51525
Viscosity Range	0.0006 $in.^3$/s to 0.0195 $in.^3$/s (10 mm^3/s to 320 mm^3/s)
Filtration	25 µm to 40 µm
Installed Position	Any
Seal Material	NB Rubber
Nominal Voltage	24 VDC (18 to 32 VDC)
Power Consumption	10 Watt (per solenoid)
Electrical Connection	AMP Superseal Series 1.5 plug (double-pole)
Duty Cycle	100% ED

Manifold Valve Operation

The manifold valves operate as follows:

1. Hydraulic pressure is applied to the P (pressure) fitting of a valve.
2. A solenoid coil (item 2) is energized by an 18V - 32V DC signal.
3. The coil forces the 3-position solenoid spool to move. This is illustrated in the section of the graphic labeled “energized position.”
4. Fluid flows from the center pressure line out to the cylinder.
5. A pilot pressure pushing on the check valve opens the return path.
6. The variable flow control valve on the return line can control the flow or cylinder speed.
   - A flow control screw on each valve can be adjusted with a 2.5mm Alan wrench.
   - Turning the screw clockwise reduces the flow. (See FIGURE 4-8 for the location of the flow control screws.)
7. When power is removed from the solenoid, the valve locks in the neutral position. This prevents any cylinder movement.

COLUMN HYDRAULICS

General Information

FIGURE 4-9 shows a schematic of the column cylinders.

All cylinders in the column are dual actuated, which means that hydraulic pressure is required to push the cylinder in both directions. The foot locks, which are on the base, are single action poppet valves: pressure is required only to move the legs to the locked position.

There are 2 lift cylinders: One in the lower stage and the other in the upper stage.

The lift cylinders are not field replaceable. Although highly unlikely, a failure of one of these cylinders will require that the table be returned to the manufacturing facility for repair. A loaner table may be shipped for the customer to use while repairs are being made.

There is one Trendelenburg cylinder.

There is one Tilt Cylinder.

There is a hydraulic fluid distribution block to connect many of the valves and cylinders.

The solenoid valves on the “A” side in the schematic are on the left side of the hydraulic manifold, and the solenoid valves on “B” side in the schematic are on the right side of the manifold.

All solenoid valve labels start with “Y”

The column Solenoids and their functions are listed in Table 4-2.

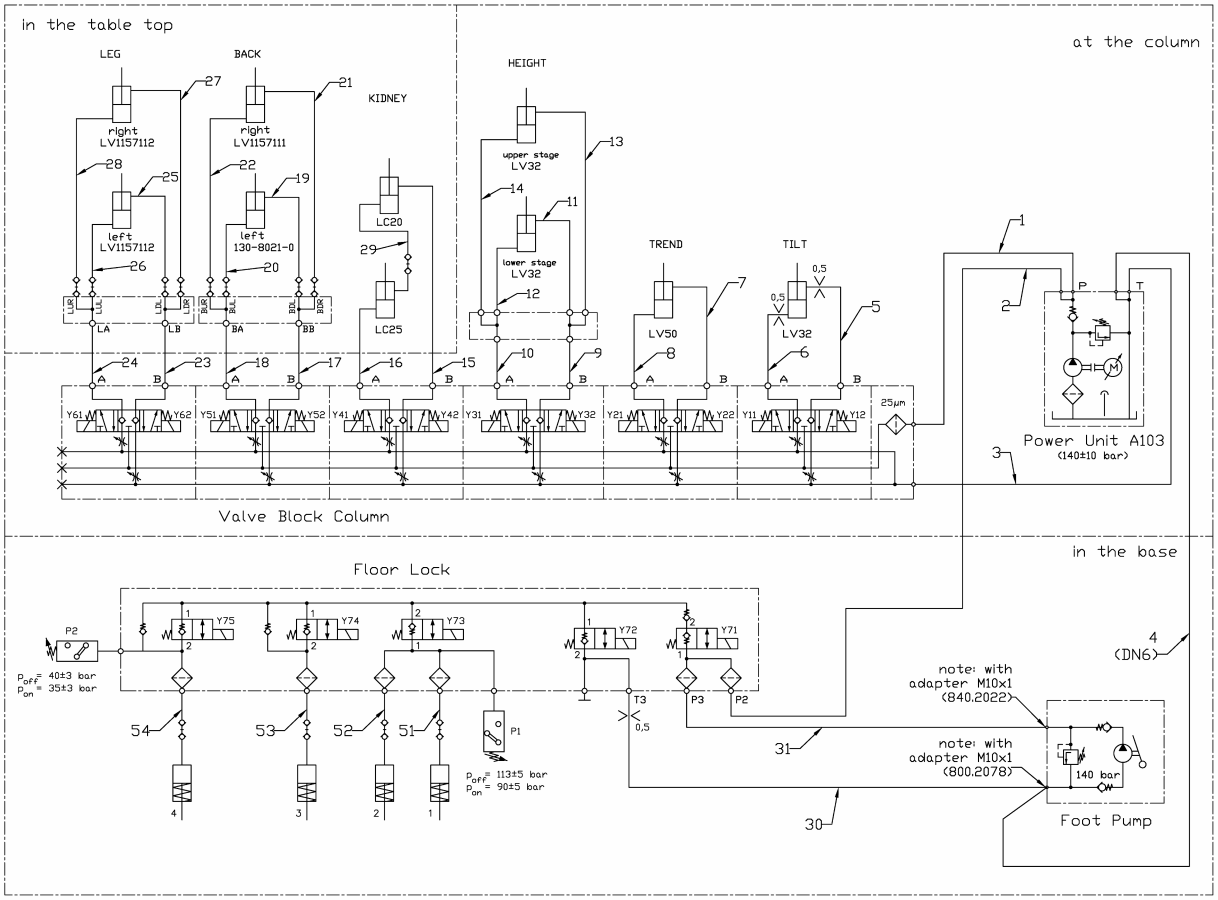


FIGURE 4-9. COLUMN CYLINDER SCHEMATIC

TABLE 4-2 COLUMN SOLENOIDS

Function	Solenoid Valve	Side
Tilt Up	Y11	A
Tilt Down	Y12	B
Trendelenburg	Y21	A
Reverse Trendelenburg	Y22	B
Height Up	Y31	A
Height Down	Y32	B
Kidney Up	Y41	A
Kidney Down	Y42	B
Back Up	Y51	A
Back Down	Y52	B
Leg Up	Y61	A
Leg Down	Y62	B

Operation

Height Up and Down

Hydraulically, the two lift stages move in parallel.

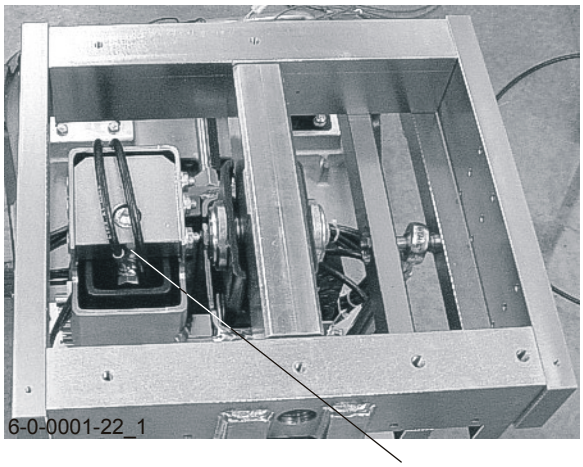


FIGURE 4-10. LIFT TUBES/CYLINDERS

The Lift cylinders are not visible from outside the column. They are inside the lift tubes. FIGURE 4-10 illustrates the location of the lift tubes/cylinders. Note the tilt cylinder in FIGURE 4-11.

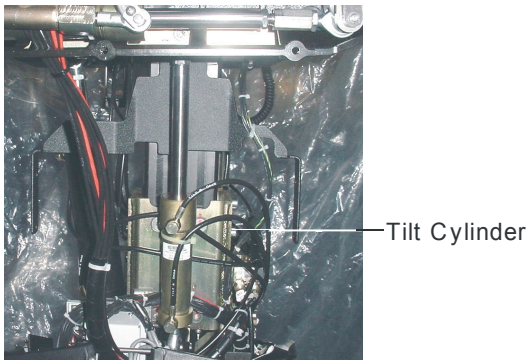


FIGURE 4-11. TILT CYLINDER AND UPPER LIFT TUBE

Tilt Left and Right

BERCHTOLD recommends that the tilt cylinders not be replaced by the end user because of the risk of contamination entering the hydraulic system.

Tilt right and tilt left are independent of any other function.

Tilt right is achieved by solenoid Y12 retracting the tilt cylinder. This pulls the right side of the table down.

Tilt left is achieved by solenoid Y11 extending the tilt cylinder. This pushes the right side of the table up.

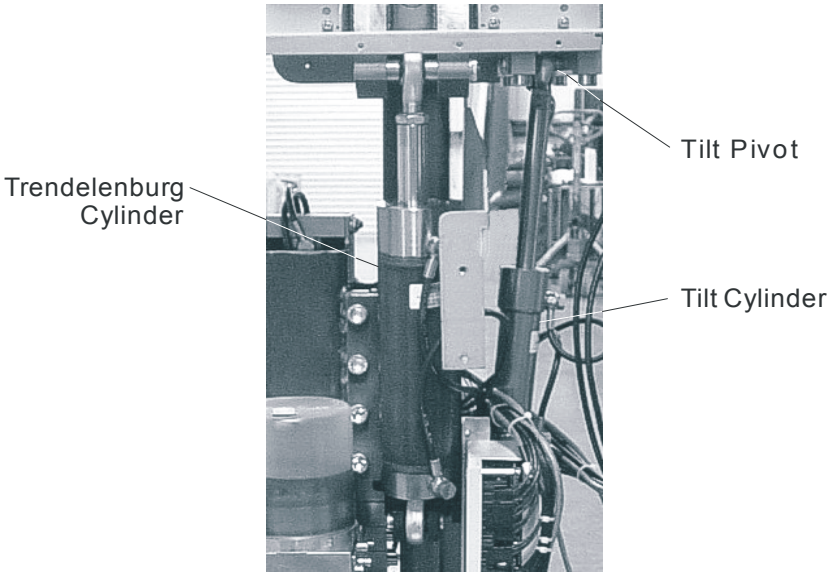


FIGURE 4-12. TILT OPERATION

Trendelenburg and Reverse Trendelenburg

Trendelenburg and reverse Trendelenburg are independent of any other column function with the exception of limitations listed in Table 2-1.

There is a single Trendelenburg cylinder on the foot side of the column (FIGURE 4-12).

Trendelenburg is activated via solenoid Y21.

Reverse Trendelenburg is activated via solenoid Y22.

BERCHTOLD recommends that the Trendelenburg cylinder not be replaced by the end user because of the risk of contamination entering the hydraulic system..

Table Top Hydraulics

The table top hydraulics consist of the back, leg, and kidney cylinders. The table top hydraulic schematic is shown in FIGURE 4-9. The manifold and solenoid valves are shown in FIGURE 4-13.

The pressure and tank lines for the top column manifold are shrouded by the bellows. They feed through side openings below the table top (FIGURE 4-14). Side frame cylinders are shown in FIGURE 4-15 and FIGURE 4-16.

The back and leg cylinders are in parallel; the kidney cylinders are in series.

The left and right kidney cylinders are also different (FIGURE 4-18). The left kidney cylinder has a stroke of 36mm, and the right kidney cylinder has a stroke of 30mm. The kidney sensor is a optical switch mounted on the left side of the table.

BERCHTOLD recommends that the table top cylinders not be replaced by the end user because of the risk of contamination entering the hydraulic system.

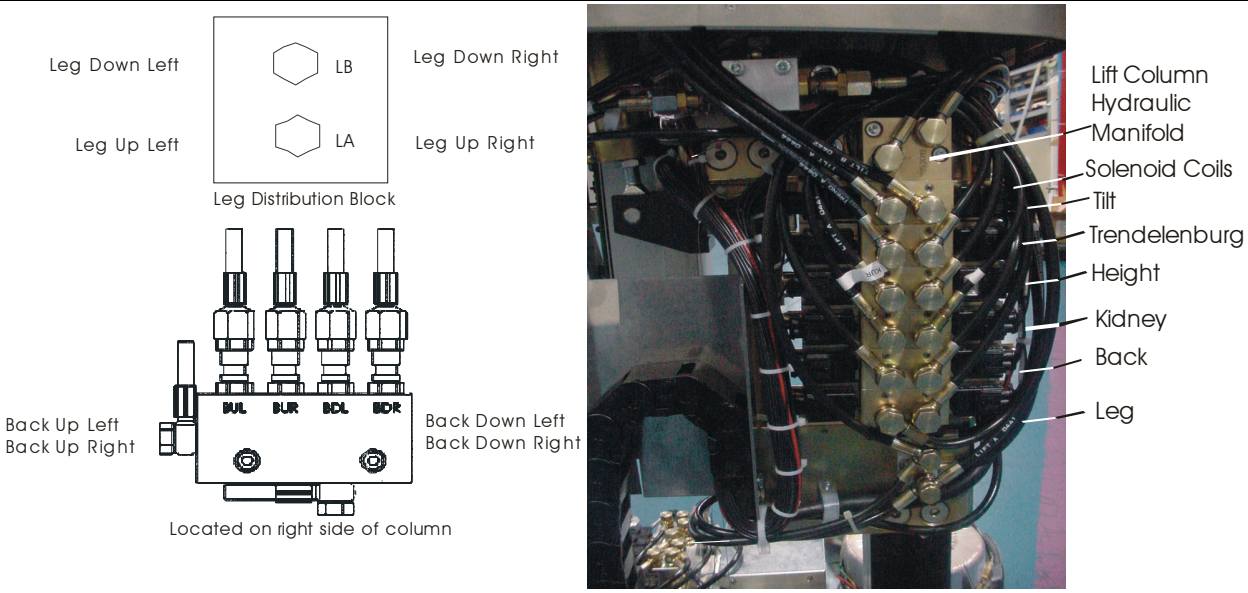


FIGURE 4-13. MANIFOLD AND SOLENOIDS

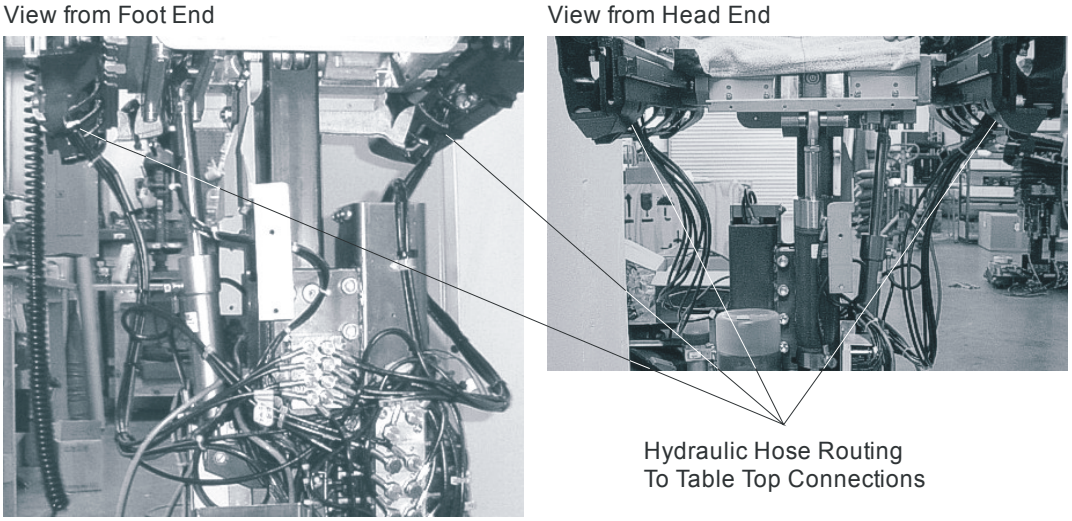


FIGURE 4-14. HOSE ROUTING

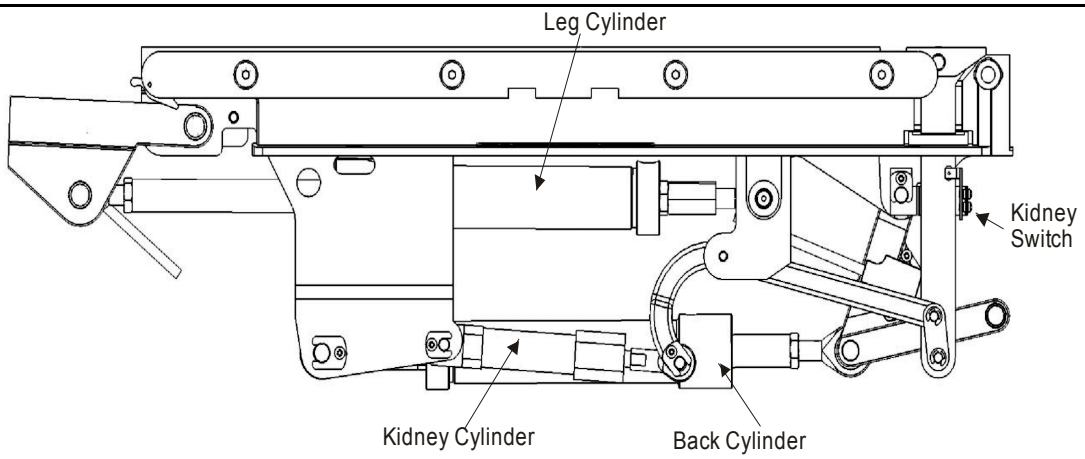


FIGURE 4-15. LEFT SIDE FRAME CYLINDERS

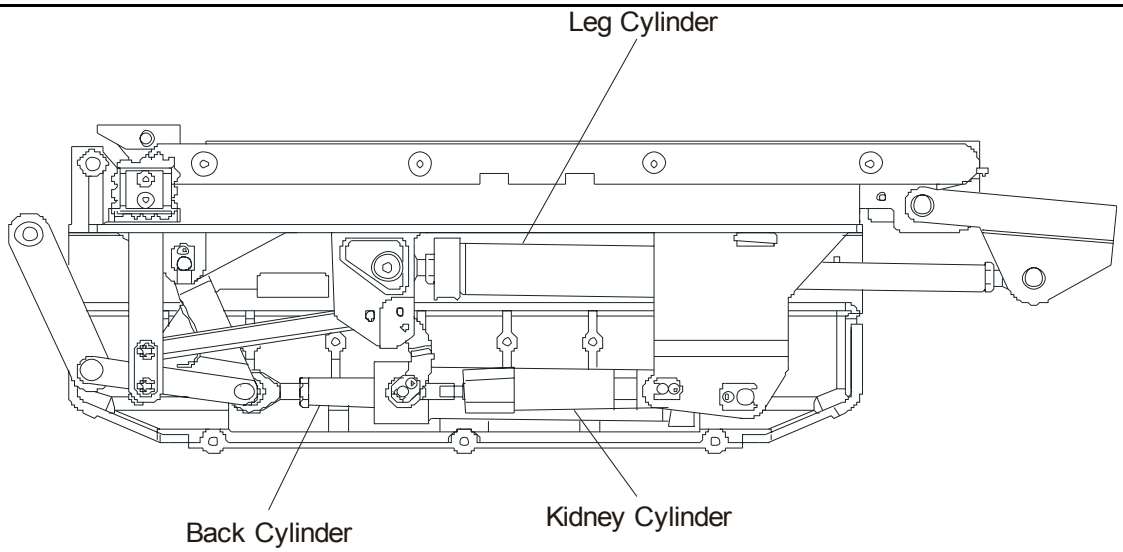


FIGURE 4-16. RIGHT SIDE FRAME CYLINDERS

FIGURE 4-17 and FIGURE 4-18 show cylinders exploded. The back and leg cylinders have different strokes (and part numbers), but their construction is the same. Similarly, the two kidney cylinders have different strokes (and part numbers), but their construction is the same.

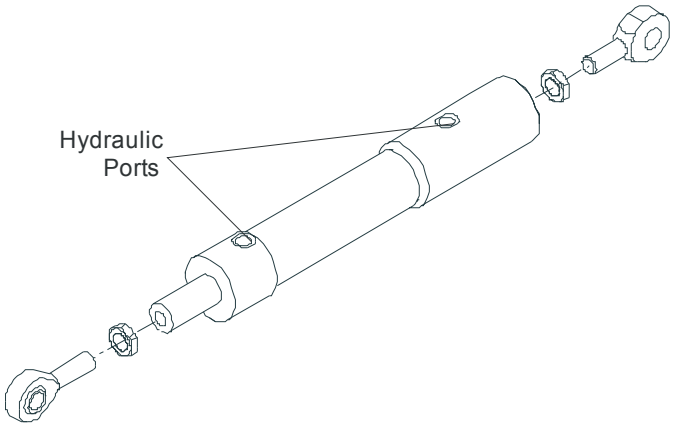


FIGURE 4-17. BACK AND LEG CYLINDERS

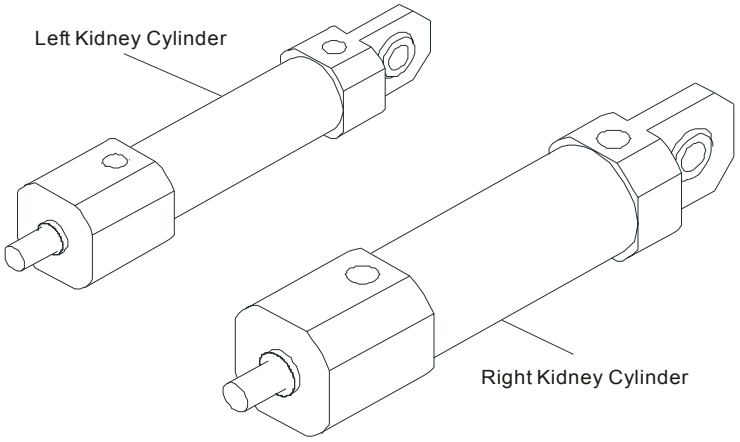


FIGURE 4-18. LEFT AND RIGHT KIDNEY CYLINDERS

HOLLOW PLUGS AND SEALS

Hydraulic lines are secured to cylinders and manifolds using hollow plugs and washers with rubber seals (FIGURE 4-19).

The seal washers should be used only once. If the hydraulic system needs to be opened, the seal washers should be replaced.

Hollow plugs and seal washers come in 2 diameters: 10mm and 8mm. The kidney and slide cylinders use 8mm plugs and seals. All other hydraulic fittings use 10mm hollow plugs and seals.

Hollow plugs also come in 2 lengths: single length and double length. The double length 10mm plugs are used where two lines must connect at the same port, such as at the foot lock manifold. The double 8mm hollow plug is used only when filling the kidney cylinders, because they are connected in series.

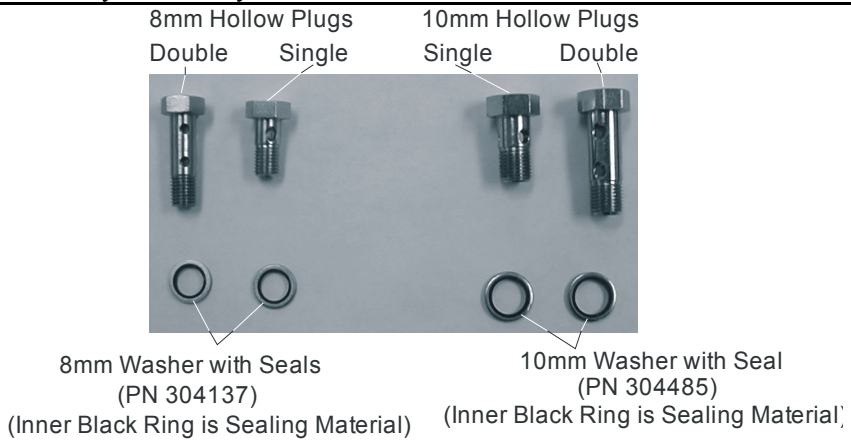


FIGURE 4-19. HOLLOW PLUGS AND WASHERS

Using Hollow Plugs and Washers to Secure Hydraulic Lines

The 10mm Hollow plugs have a 14mm hex head.

The 8mm Hollow Plugs have a 12mm hex head.

A Washer must be placed between any 2 surfaces. A single length hollow plug requires 2 washers, and double length requires 3 washers (FIGURE 4-20).

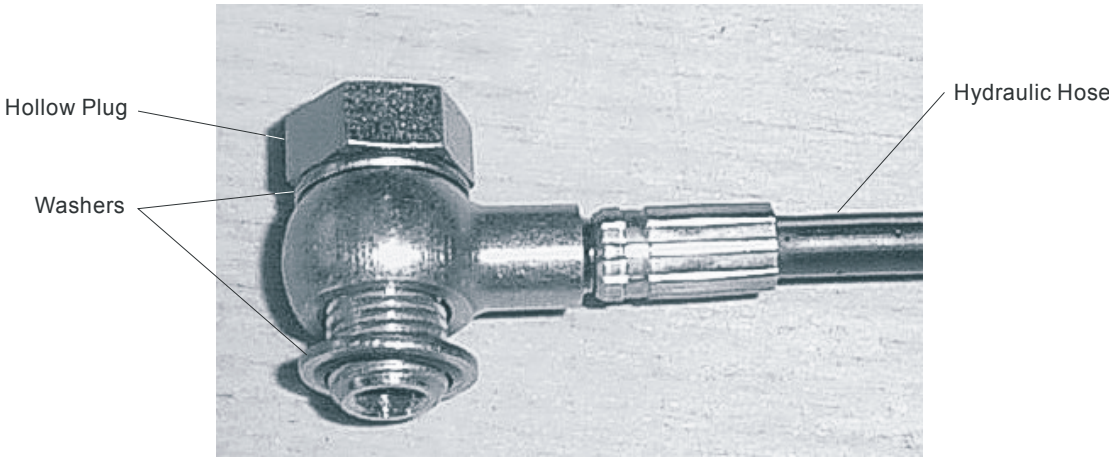


FIGURE 4-20. SECURING HYDRAULIC LINES

Hollow Plug Torque Specifications

CAUTION

CAUTION *– Do not over tighten the hollow plugs. Over tightening can cause the seals to deform and leak.*

Hollow plugs must be torqued to the settings specified (± 10%) in TABLE 4-3. Be careful not to over torque the fittings.

TABLE 4-3 HOLLOW PLUG TORQUE SPECIFICATIONS

Plug Size	Torque Setting	
	Ft Lb	N•M
M8	7.3	10
M10	10.3	14
G1/8 (1/8” NPT)	10.3	14

HYDRAULIC FLUID

The **OPERON B 810** Surgical TableC8 hydraulic system uses BP Energol HLP-HM 32 (or ARAL VITAM DE 32) hydraulic fluid (see Drawing 306762 in Section 8). This hydraulic fluid is available world wide, but can also be purchased from BERCHTOLD.

CAUTION

CAUTION – *Do not mix hydraulic fluid types. Other hydraulic fluids can be incompatible with the seals in the OPERON B 810 table and can cause equipment failure or reduce the service life.*

ELECTRICAL SYSTEM

WARNING – *When servicing the table, turn power off or remove the appropriate fuses to prevent personal injury. If power is required, use care to avoid contact with live parts.*

NOTE – The table can be factory configured for 230 VAC operation based on customer order requirements. The modifications involve only components associated with the AC mains supply. The information below describes only the 115 VAC components. Refer to the schematic diagrams in Section 5 and the parts listing in Section 8 for identification of the 230 VAC components.

The **OPERON B 810** electrical system schematics (wiring diagrams) are provided in 2 sections. FIGURE 5-2 (including 4 detail sheets) shows the system electronics. 0 is a schematic of the base electrical wiring.

The electrical system is made up of 8 parts:

1. CPU and Auxiliary Board
2. Connector Board
3. Extension Board
4. Position Sensors and Switches
5. Power Supply System
6. Power Input System
7. Controls (Main and Auxiliary Pendants)
8. Slide Motor.

CPU and Auxiliary Board

The Central Processing Unit (CPU) consists of a main and an auxiliary board. The CPU is the brains of the table. It contains the software and controls the operation of the solenoids and power unit based on inputs from the operator (via the pendant) and signals from the table (via the positioning sensors and switches).

A second CPU serves as a back up for the primary CPU. In the event of a failure of the primary CPU, the primary hand pendant connection can be moved from connector CPU J6 (the factory setting) to CPU J4. The table will operate with all of the same functions and capabilities whichever CPU is providing the control and monitor functions.

The Auxiliary board is mounted piggy-back on the CPU board. Its primary function is to route input and output signals between the CPU and the table's sensors and actuators.

The CPU and Auxiliary boards are located on the left side of the column (FIGURE 4-21).

FIGURE 4-22 shows the connections and identifies the cable routings from the CPU (CPU). FIGURE 4-23 shows the connections and identifies the cable routings from the auxiliary board.

TABLE 4-4 identifies the power connections on the CPU's J2 and J4 connectors. TABLE 4-5 provides a listing of all the cables and describes their connections.

Neither the CPU nor the auxiliary board contains field serviceable parts. Either must be replaced as a complete assembly.

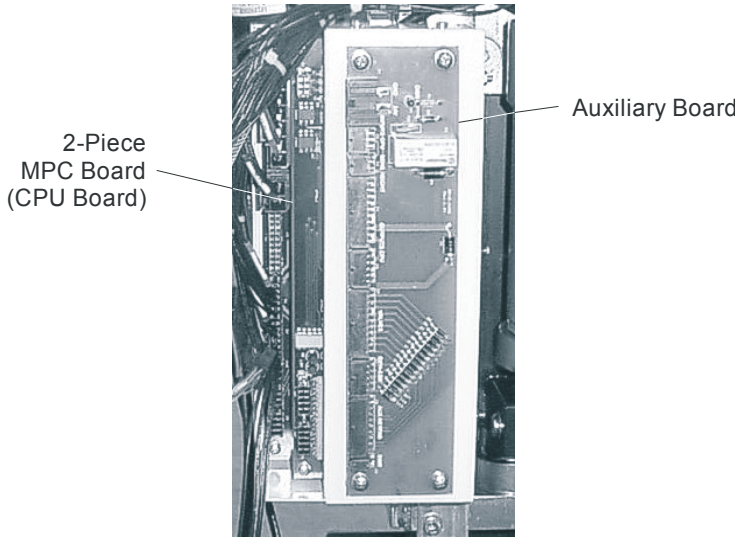


FIGURE 4-21. CPU LOCATION ON COLUMN

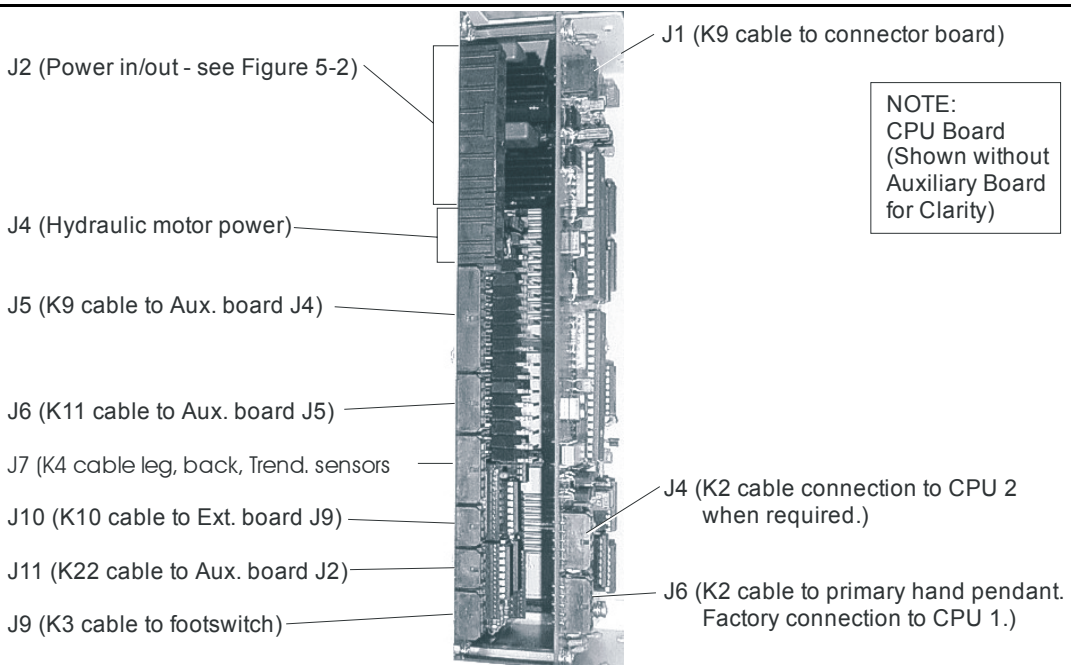

J2 (Power in/out - see Figure 5-2)
J4 (Hydraulic motor power)
J5 (K9 cable to Aux. board J4)
J6 (K11 cable to Aux. board J5)
J7 (K4 cable leg, back, Trend. sensors
J10 (K10 cable to Ext. board J9)
J11 (K22 cable to Aux. board J2)
J9 (K3 cable to footswitch)
J1 (K9 cable to connector board)
NOTE:
CPU Board
(Shown without
Auxiliary Board
for Clarity)
J4 (K2 cable connection to CPU 2
when required.)
J6 (K2 cable to primary hand pendant.
Factory connection to CPU 1.)

FIGURE 4-22. CPU BOARD CONNECTIONS

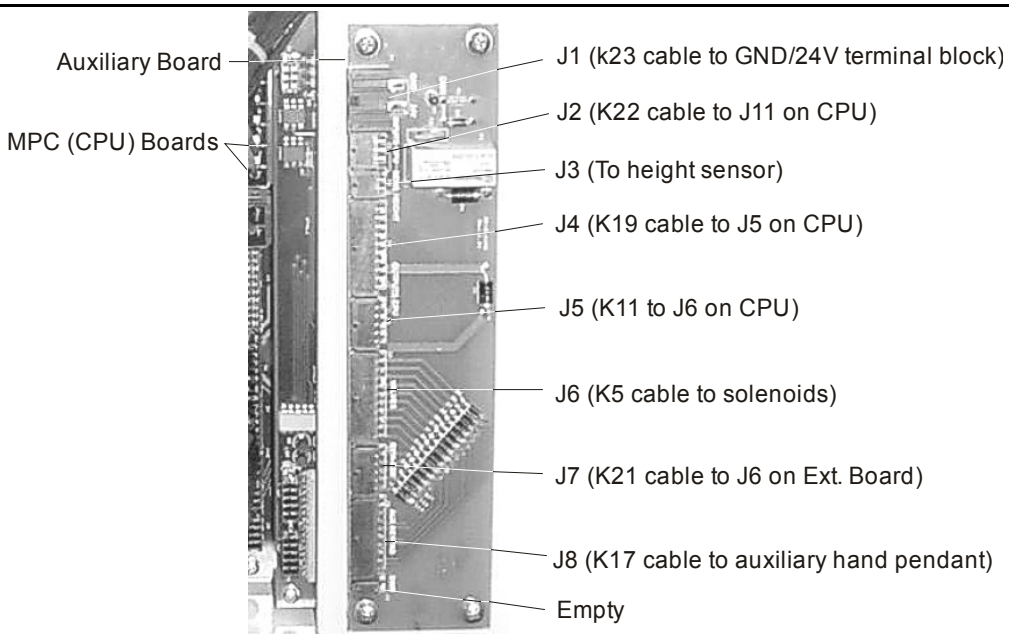

Auxiliary Board
MPC (CPU) Boards
J1 (k23 cable to GND/24V terminal block)
J2 (K22 cable to J11 on CPU)
J3 (To height sensor)
J4 (K19 cable to J5 on CPU)
J5 (K11 to J6 on CPU)
J6 (K5 cable to solenoids)
J7 (K21 cable to J6 on Ext. Board)
J8 (K17 cable to auxiliary hand pendant)
Empty

FIGURE 4-23. AUXILIARY BOARD CONNECTIONS

TABLE 4-4 CPU POWER CONNECTORS

Pin	Signal
J4-1	24V+
J4-2	Common
J2-1	24V Power
J2-2	24V CPU
J2-3	GND-Power
J2-4	GND-CPU
J2-5	Battery State Variable
J2-6	AC State 24V

TABLE 4-5 WIRING HARNESS APPLICATIONS

Harness Number	Part Number	Routing
K1	306649	Hand pendant
K2	306543	Hand pendant board plug to CPU J6 (or CPU J4)
K3	306544	CPU J9 to footswitch
K4	306545	CPU J7 to J7-2 and J7-1
K4 (P/O)	306998	J7-2 to leg sensor and back sensor
K4 (P/O)	306996	J7-1 to Trend sensor and tilt sensor
K5	306546	Auxiliary board J8 to solenoids on column
K6	306547	CPU J4 to hydraulic motor and P10-2
K7	306556	AC input to CPU connector J2-1
K7 (P/O)	306548	AC input to CPU J2 pins 6 and 5
K8	306549	Extension board J4 to floor lock manifold
K9	306550	Connector board RS232 plug to CPU J1
K10	306807	CPU J10 to extension board J9
K11	306552	CPU J6 to auxiliary board J5
K12	306553	Extension board J7 to floor lock pressure switches P1 and P2
K14	306558	Extension board J8 to J8-2 and J8-1
K14 (P/O)	307012	Slide potentiometer
K14 (P/O)	307029	J8-1 to kidney switch & slide sensor
K15	306559	Extension board J3 to slide motor
K17	(306650 Aux Pendant)	Auxiliary hand pendant to auxiliary board cable connector J8-1
K17 (P/O)	306816	Auxiliary board cable connector J8-1 to auxiliary board J8
K18	306551	Extension board J5 to kidney down solenoid Y42 (pins 1 and 2) and to kidney up solenoid Y41 (pins 3 and 4)
K19	306815	CPU J5 to auxiliary board J4
K20 (P/O)	306900	Auxiliary board connector P9-1 to auxiliary board P9.
K21	306814	Auxiliary board J7 to extension board J6
K22	306817	CPU J11 to auxiliary board J2
K23	306818	Terminal block (24V and GND) to auxiliary board J1
K24	306879	Terminal block (24V) to extension board J2
		CPU J2 pin 1 (24V power) to terminal block
		CPU J2 pin 2 to (24V CPU) to terminal block
		CPU J2 pin 3 (GND power) to terminal block
		CPU J2 pin 4 (GND CPU) to terminal block
		CPU J2 pin 5 (battery state) to P2-1 pin 1
		CPU J2 pin 6 (AC state 24V) to P2-1 pin 2
	306944	Terminal block to line filter
	307015	J3 EXB to height sensor

Connector Board

The connector board is located on the top of the bellows on the left side of the table. This board connects the CPU to the RS-232 PC interface (FIGURE 4-24).

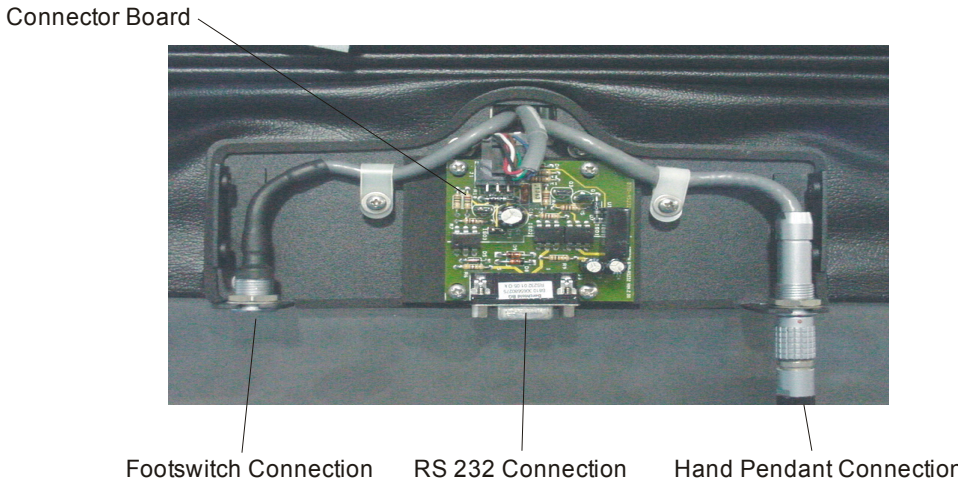


FIGURE 4-24. CONNECTOR BOARD

Extension Board

The extension board is located at the base of the column on the left side of the table. The extension board provides the input for 24V power and serves as a distribution point to route power to a number of solenoid controls and mechanical sensors (FIGURE 4-25). The wiring diagrams and the electrical schematic on page 5-2 (et seq.) provide additional information on these connections.

The LEDs on the right side of the board light while the associated function is active.

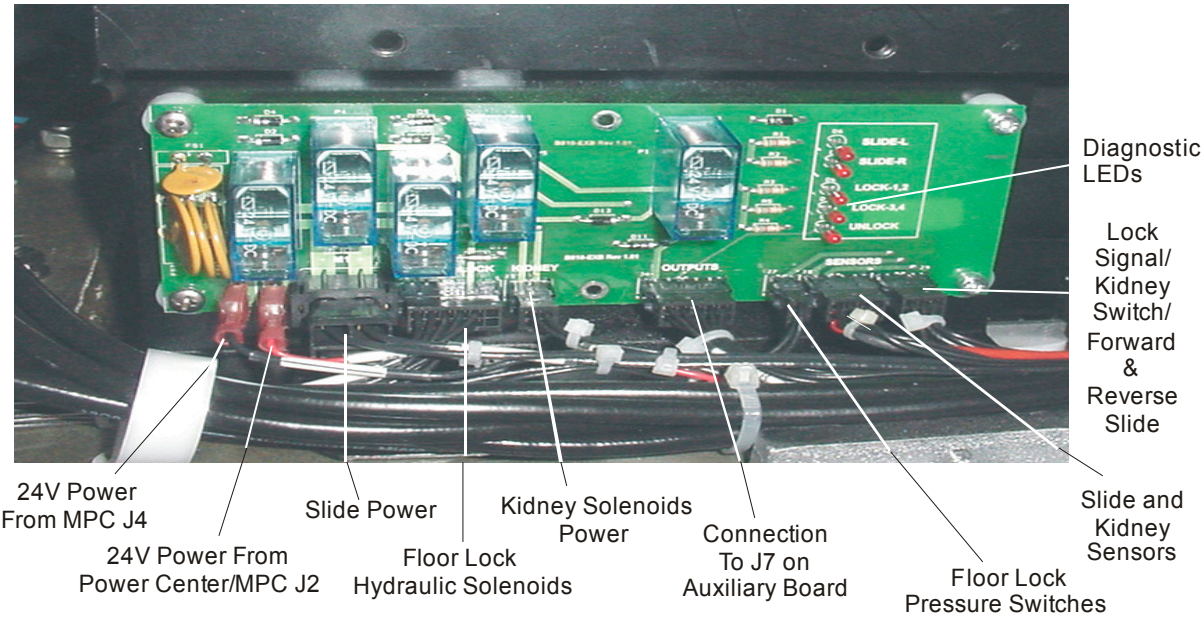

Diagnostic LEDs
Lock Signal/ Kidney Switch/ Forward & Reverse Slide
24V Power From MPC J4
24V Power From Power Center/MPC J2
Slide Power
Floor Lock Hydraulic Solenoids
Kidney Solenoids Power
Connection To J7 on Auxiliary Board
Floor Lock Pressure Switches
Slide and Kidney Sensors

FIGURE 4-25. EXTENSION BOARD CONNECTIONS

Position Sensors and Switches

The position sensors provide the CPU with information about the position of the table for use in return-to-level, chair, and flex settings, and in software control limits.

There are 7 sensors and switches in the table:

1. Slide Sensor
2. Leg Sensor
3. Back Sensor
4. Tilt Sensor
5. Trendelenburg Sensor
6. Kidney switch
7. Auxiliary Pendant Drawer Switch
8. Height Sensor

The slide, leg, back, Trendelenburg, and tilt sensors are excited with 5 volts. The kidney switch is excited with 24 volts (or system power).

An auxiliary pendant drawer switch provides power to the auxiliary pendent when the drawer is opened.

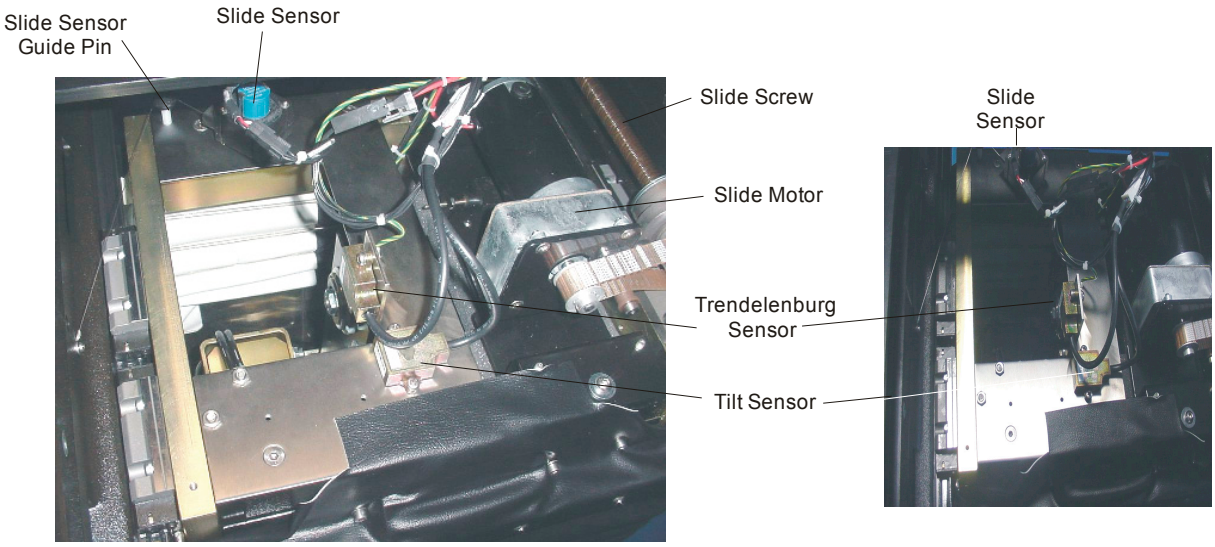


FIGURE 4-26. TILT, TRENDELENBURG, AND SLIDE SENSOR LOCATIONS

Tilt and Trendelenburg Sensors

The tilt and Trendelenburg sensors are standard accelerometers used extensively in the automotive industry (FIGURE 4-26).

The tilt and Trendelenburg sensors are the same.

Both are excited with 5 volts, and have an output of between 0.200 –4.9 volts. The nominal voltage at level is 2.5 volts.

Slide Sensor & Height Sensor

The slide sensor is a DC potentiometer (10k Ω voltage divider) with an output signal from 0 to 5 VDC (FIGURE 4-27).

Software senses readings from 0.5 (at extreme forward slide) to 4.5 VDC (at extreme reverse slide). A reading of 1.5 VDC is nominal when the table top is centered over the column.

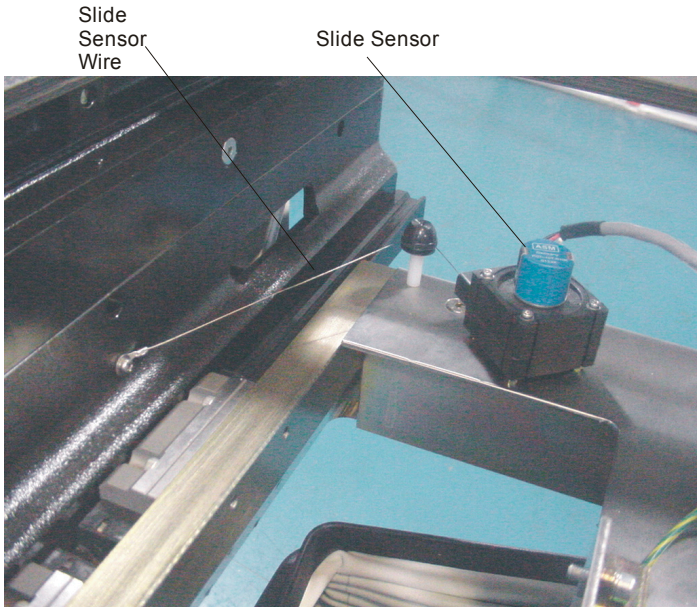


FIGURE 4-27. SLIDE SENSOR

Kidney Switch

The kidney switch is mounted on a bracket on the left side of the table (opposite the leg and back sensors) (FIGURE 4-28).

The kidney switch provides a signal to the CPU to determine the position of the kidney elevator. The switch harness is run with the hydraulic lines to the table top.

A signal of 2.5 volts indicates that the kidney elevator is up. A signal of 4.5 volts indicates that it is down.

The nominal slide sensor voltage is 1.2v.

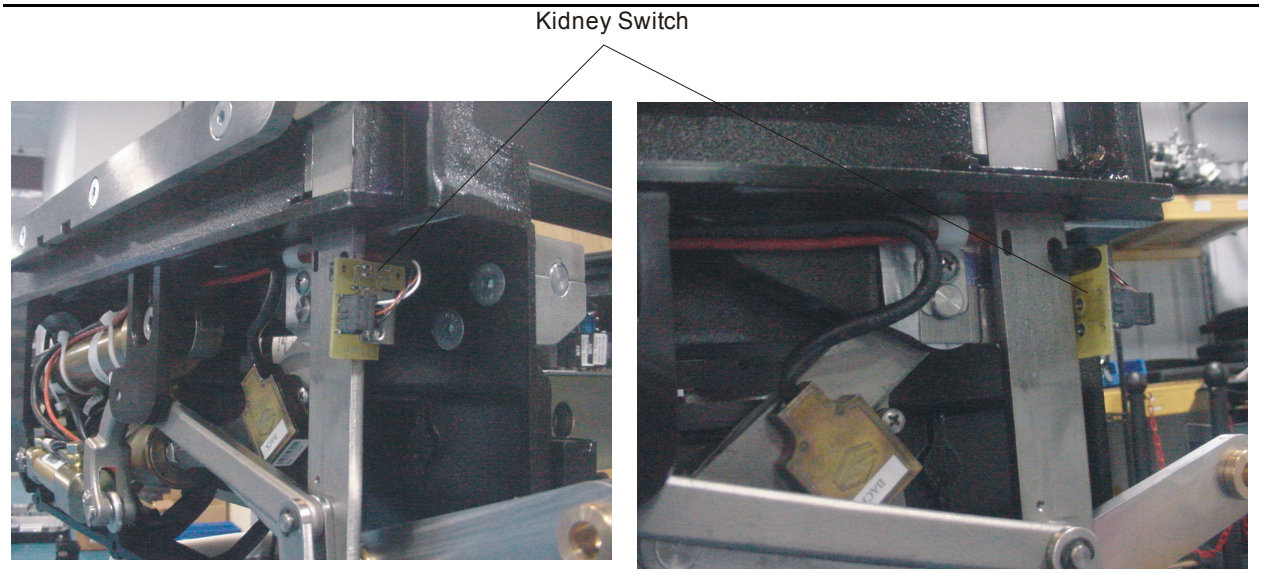


FIGURE 4-28. KIDNEY SWITCH

Auxiliary Pendant Switch

The auxiliary pendant switch is a reflective optical switch. When it senses no pendant present, it signals the CPU to provide power to the auxiliary pendant.

Opening the auxiliary pendant drawer does not affect the operation of the main pendant. The main pendant remains active.

The auxiliary pendant switch is located above the pendant storage area.

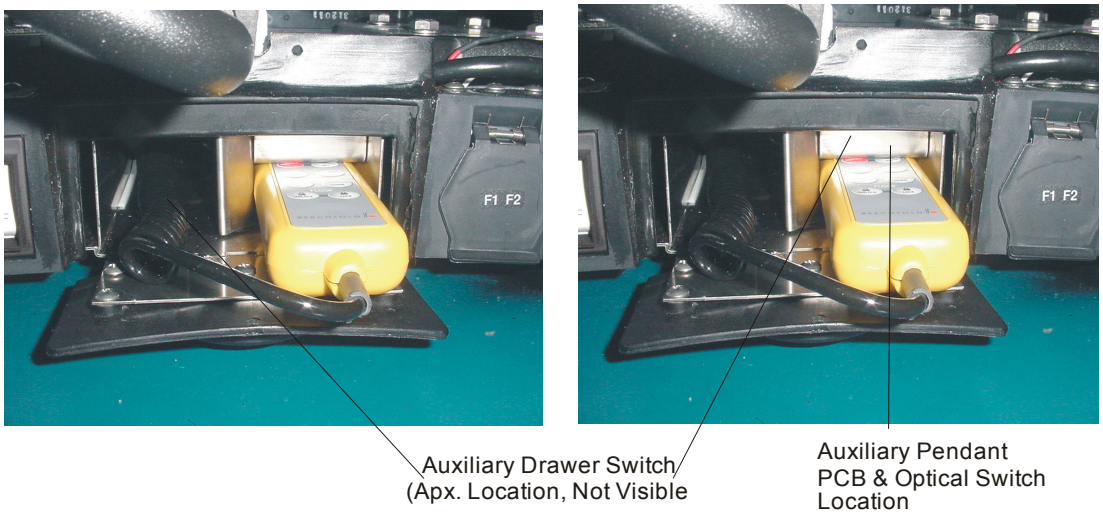


FIGURE 4-29. AUXILIARY DRAWER SWITCH

Power Supply System

The power supply system is made up of 3 main components (FIGURE 4-30):

1. The isolation transformer
2. The power supply/charger assembly
3. The batteries

The isolation transformer takes 120VAC and provides 120VAC to the power supply. Its purpose is to reduce leakage current.

The power supply/charger assembly will provide power to the table if the batteries are not installed. It also charges the batteries.

The power supply is a 450 Watt switcher. A micro-controller in the charger board controls the output to the batteries for proper charging. The output varies from 24 volts to 32 volts. This voltage will run the table if the batteries are not connected.

The power supply does not contain any field serviceable parts. It must be replaced as a unit. The transformer and batteries also must be replaced as units.

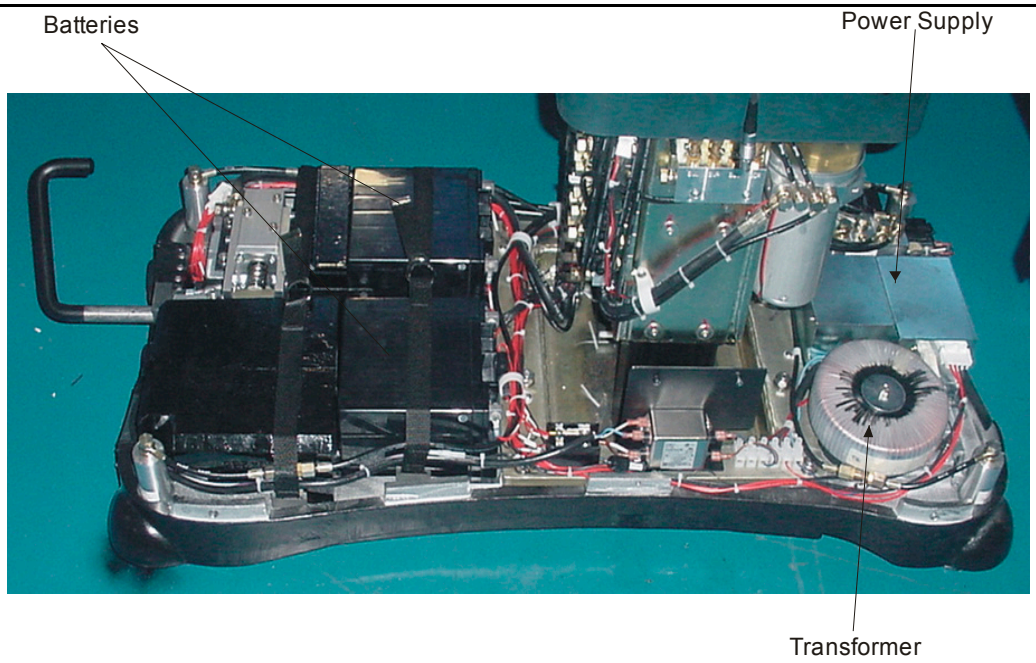


FIGURE 4-30. POWER SUPPLY SYSTEM

Batteries

Two 12V, 28Amp-hour sealed lead acid batteries provide the main power source for the table. The batteries are wired in series to provide 24V of power to the DC circuits.

The batteries automatically take over as the power source when AC is not connected.

Charging is automatic any time the AC mains power supply is connected to the table. The batteries cannot be overcharged: a software monitor in the charging system automatically disconnects the charging system when the batteries are fully charged or after a continuous 8 hours of charging.

Batteries have an expected service life of three years. They are field replaceable.

Battery Replacement

Do this to replace the batteries:

WARNING – *Even a "dead" battery can contain enough power to cause a serious shock or explosive spark. Always disconnect the battery charger plug at the power center before disconnecting cables.*

WARNING – *the batteries contain acid, which can cause serious burns. While the batteries are sealed, a dead battery may be damaged and may leak. Always handle batteries in a way that will prevent acid spilling on your skin or clothes.*

1. Disconnect the table from the AC Mains power source, if necessary.
2. Turn the DC power switch to the OFF position.
3. Remove the base covers.
4. Disconnect the battery charger connector from the power supply (FIGURE 4-31).

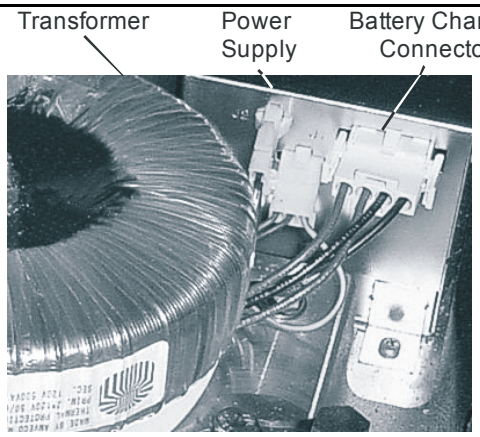


FIGURE 4-31. BATTERY CHARGER CONNECTION AT POWER SUPPLY

5. Disconnect the red cable from the positive terminal of the right-hand battery (FIGURE 4-32).

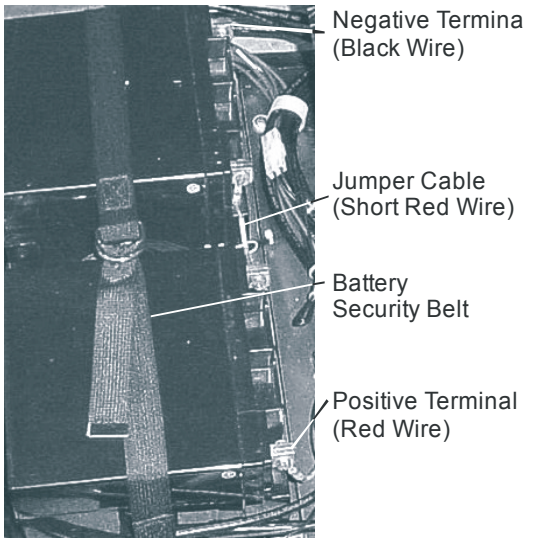


FIGURE 4-32. BATTERY TERMINAL IDENTIFICATION

6. Disconnect the black cable from the negative terminal of left-hand battery.
7. Remove the short red jumper cable from both batteries.
8. Un-cinch the battery retaining strap.
9. Lift each battery out of the base.
10. Reverse the procedure to install new batteries.
11. Connect table to AC Mains.
12. Allow batteries to charge over night or for a minimum of 8 hours before operating table on battery power.

The table can be used immediately, but the AC mains power supply must remain connected until the batteries are fully charged. A full battery charge is indicated by the lighting of the green LED on the hand pendant.

Power Input System

The power input system is made up of 2 power centers at the head of the table (FIGURE 4-33).

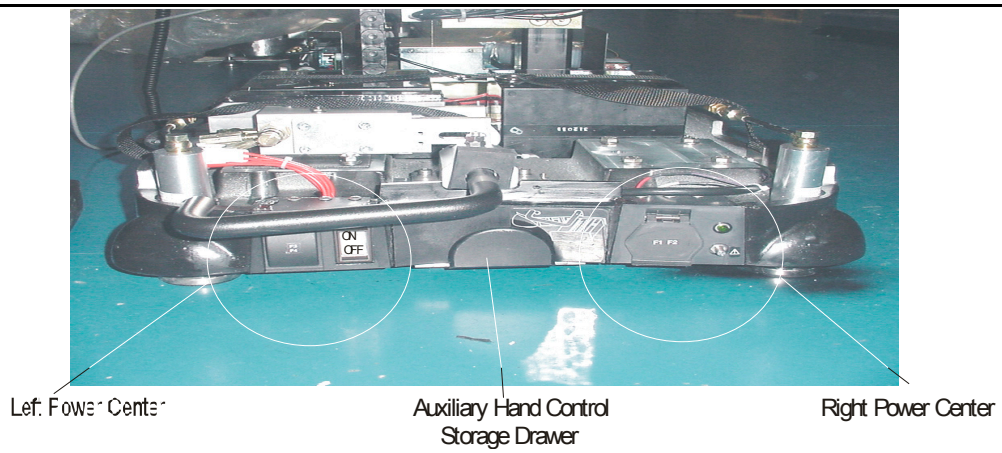


FIGURE 4-33. POWER CENTERS

Left Power Center

The left power center contains the main DC breaker and the DC power fuses (FIGURE 4-35). It rating is 20Amps.

The 20 Amp DC circuit breaker also functions as the table's ON/OFF switch. The DC breaker must be ON to run the table, but does not need to be on to charge the batteries. The DC breaker does not affect charging the batteries.

FIGURE 4-34 shows the DC fuses in the left power center. Table 4-6 identifies the circuit each fuse protects.

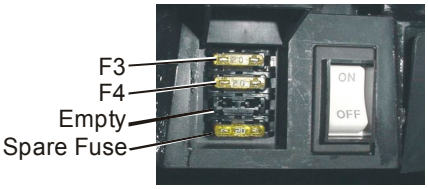


FIGURE 4-34. DC FUSE IDENTIFICATION

TABLE 4-6 BLADE FUSES

Location	Fuse	Fuse Rating
F3	Battery	20 Amp
F4	Hydraulic Pump	20 Amp
F5	Empty	
	Spare	20 Amp

The left power center contains field replaceable parts or it can be replaced as an assembly.

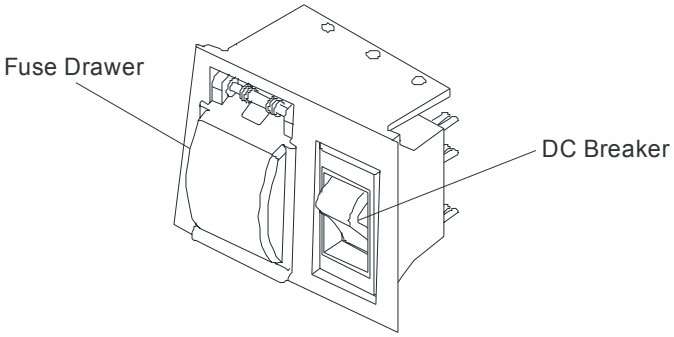


FIGURE 4-35. LEFT POWER CENTER

Right Power Center

The right power center contains 4 elements (FIGURE 4-36):

1. The AC input receptacle
2. The AC fuses (F1 and F2)
3. The charge indicator LED
4. The ground stud

The AC input line and neutral are fused with 8 Amp time delay fuses.

The charge indicator LED illuminates green when AC is applied to the table and the batteries are charging. The indicator should always be illuminated if AC is applied.

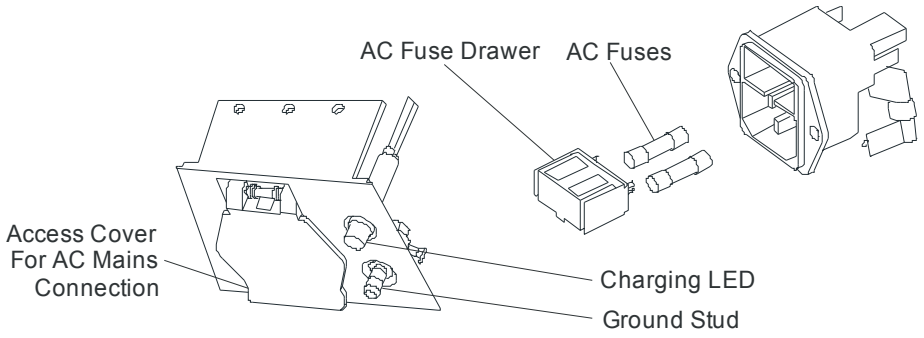


FIGURE 4-36. RIGHT POWER CENTER

CONTROL PENDANTS

Primary Hand Pendant

WARNING – The table has two hand pendants that can control its movements. Both can be active at the same time. If different functions are pressed on the different hand pendants, both functions will activate. This could lead to unexpected or unintended movement of the table sections and could result in injury to patients or personnel or in damage to the equipment. To avoid this, keep the auxiliary hand pendant securely stowed in its drawer during normal usage. When the auxiliary hand pendant is deployed during an emergency, unplug the primary hand pendant to prevent its use.

Commands are entered on the primary hand pendant through the keypad.

The primary hand pendant sends commands to the CPU via connection J6 on the CPU board.

An illustration of the primary hand pendant along with function and LED display descriptions is provided in the General Information section of this manual.

If the primary hand pendant is not communicating with the CPU, the SERVICE (Service) LED will blink.

If no AC is connected to the table, both the primary hand pendant and the table will automatically go into sleep mode 2 hours after the last function was pressed. The table may be powered up again by pressing any button on the primary hand pendant.

Pressing ON while a function is running will stop the function. Pressing any other function button while a function is running will stop the articulation. To start the articulation, release the function button and press it again.

Pressing OFF while a function is running will stop the function and turn the table off.

If AC is connected to the table, the auto-shutdown feature is disabled (i.e., the hand pendant and table operations will not automatically turn off after 2 hours of non activity).

The auxiliary hand pendant drawer does not have an affect on the primary hand pendant's power. Removing the auxiliary pendant activates the auxiliary pendant, but it does not deactivate the primary hand pendant. Thus, if a function is pressed on the primary pendant while another function is pressed on the auxiliary pendant, both valves will open and pump pressure will activate both movements.

There are no field serviceable parts in the primary hand pendant. It must be replaced as a complete assembly.

Auxiliary Hand Pendant

The auxiliary hand pendant is a backup pendant for use in case of a primary hand pendant problem, or a power problem that disables the main electric pump and the primary hand pendant.

The auxiliary hand pendant has all the functions of the primary hand pendant with the exception of FLEX, CHAIR, RETURN-TO-LEVEL, OFF, ON, FORWARD SLIDE, and reverse slide.

There are no LED indicators or back lighting on the auxiliary pendant.

An illustration of the auxiliary hand pendant along with functions descriptions is provided in the General Information of this manual.

The auxiliary hand pendant is powered when the auxiliary pendant is removed.

The auxiliary hand pendant provides power to the solenoids as long is the selected function button is pressed and held. It does not activate the hydraulic pump.

FIGURE 4-37. AUXILIARY HAND PENDANT

There are no field serviceable parts in the auxiliary hand pendant. It must be replaced as a complete assembly.

BASE WIRING

0 shows the base wiring schematic. The base wires are color coded to assist in the identification of signals. TABLE 4-7 provides a description of the color codes.

TABLE 4-7 BASE WIRING COLOR CODES

Signal	Color
Earth Ground	Green w/Yellow Stripe
AC Line Power	Brown
AC Neutral	Blue
DC Power (Main 24V)	Red
DC Common	Black
Main Solenoid Power to Fuses	White
Auxiliary Solenoid Power	Yellow
Battery Voltage Sense to CPU	Orange
AC Present to CPU And LED On Power Center	Purple
Floor Lock Manifold “Lock Signal”	Yellow
Floor Lock Manifold “Unlock Signal”	Orange
Floor Lock Status at Pressure Switch 2	White

Base, Column, and Top Electrical Connections

The figures listed in TABLE 4-8 identify the locations of the electrical connections in the base, on the column, and in the top of the table.

TABLE 4-8 BASE ELECTRICAL CONNECTIONS LOCATIONS

Figure Identification	Connection Identification	General Location in Base
FIGURE 4-38	DC fuse and breaker Connections	Behind DC power center
FIGURE 4-39	Battery and DC pump Fuse; AC mains ground	Head end
FIGURE 4-40	Auxiliary hand pendant connector	Head end between batteries
FIGURE 4-41	Base to CPU in-line fuse, Base to CPU in-line fuse, AC Signal lamp power line, AC / DC power terminals	Head end right side of column
FIGURE 4-42	Terminal strip for AC Power Center and Transformer connection; AC Power Center connections for AC Mains, Battery signal, and batter charger	Foot right
FIGURE 4-43	Floor lock manifold wiring connections	Foot left
FIGURE 4-44	Table top motor and sensor connections, including ground attachment.	Top of column under seat section
FIGURE 4-45	Column ground, hydraulic motor, and kidney switch connections	Head side of column
FIGURE 4-46	Leg and back position sensors	Left side of column

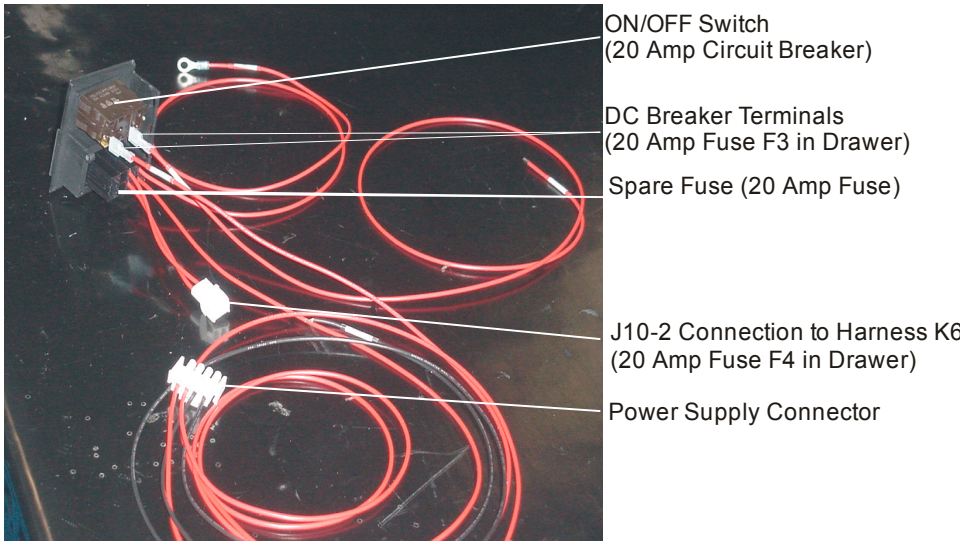

ON/OFF Switch
(20 Amp Circuit Breaker)
DC Breaker Terminals
(20 Amp Fuse F3 in Drawer)
Spare Fuse (20 Amp Fuse)
J10-2 Connection to Harness K6
(20 Amp Fuse F4 in Drawer)
Power Supply Connector

FIGURE 4-38. WIRING CONNECTIONS AT THE BACK OF THE DC POWER CENTER

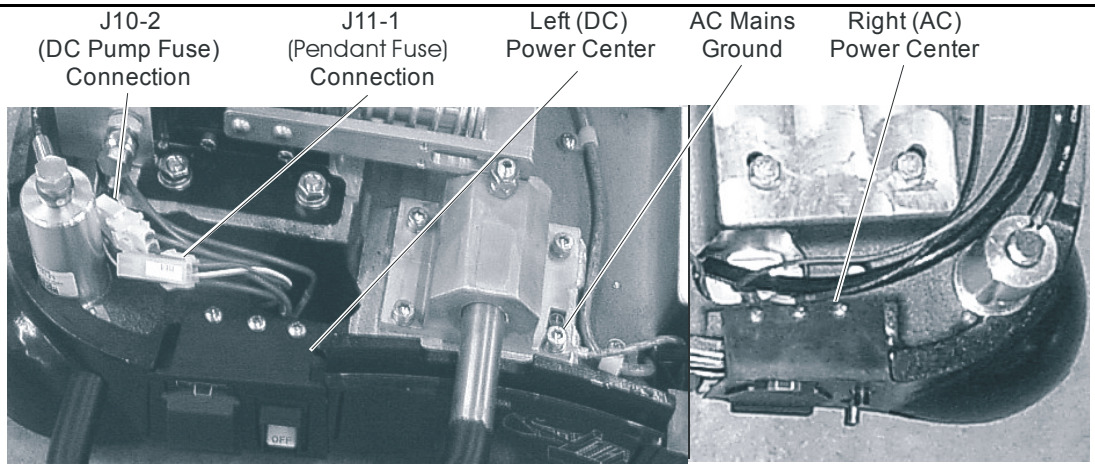


FIGURE 4-39. BASE HEAD-END WIRING CONNECTIONS

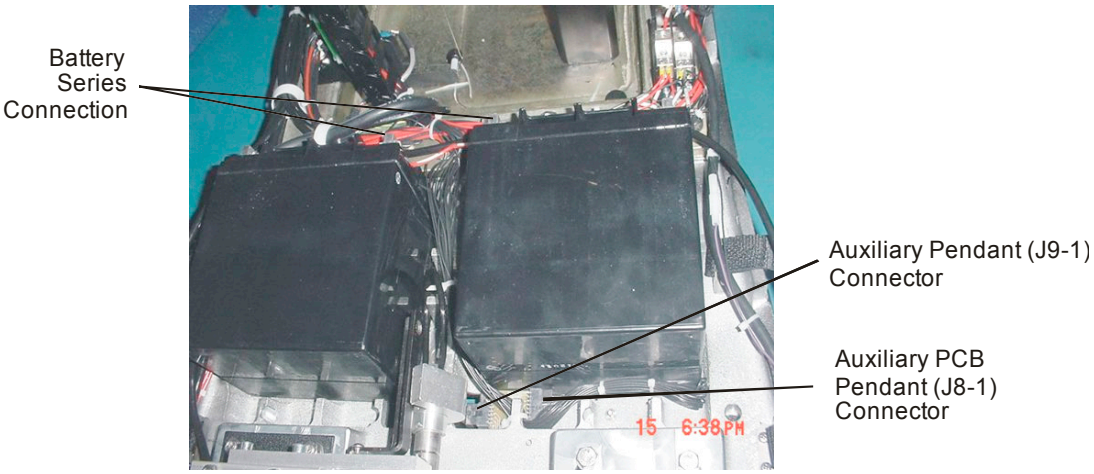


FIGURE 4-40. BASE COLUMN AREA WIRING CONNECTIONS

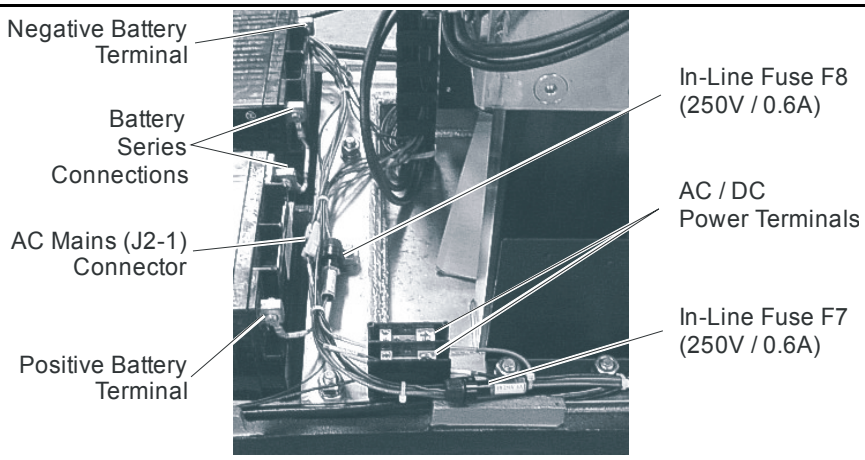


FIGURE 4-41. BASE COLUMN RIGHT WIRING CONNECTIONS

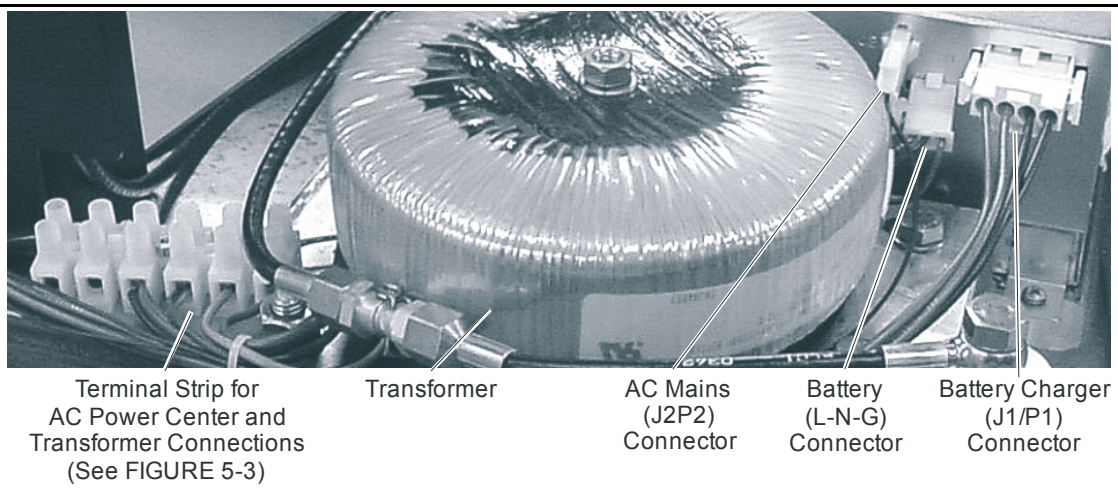

Terminal Strip for AC Power Center and Transformer Connections (See FIGURE 5-3)
Transformer
AC Mains (J2P2) Connector
Battery (L-N-G) Connector
Battery Charger (J1/P1) Connector

FIGURE 4-42. BASE FOOT END RIGHT WIRING CONNECTIONS

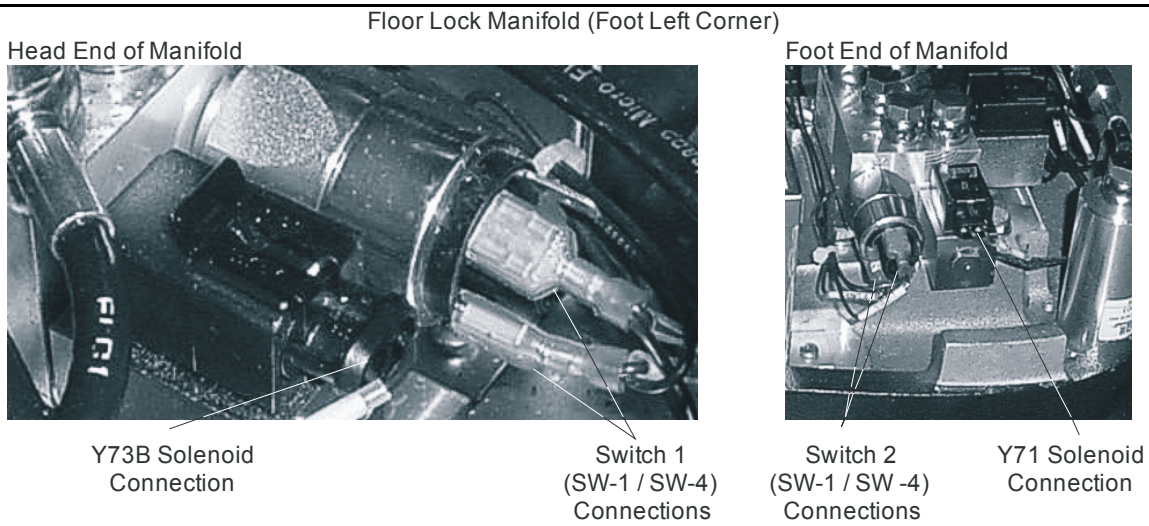

Floor Lock Manifold (Foot Left Corner)
Head End of Manifold
Foot End of Manifold
Y73B Solenoid Connection
Switch 1 (SW-1 / SW-4) Connections
Switch 2 (SW-1 / SW -4) Connections
Y71 Solenoid Connection

FIGURE 4-43. BASE FOOT END RIGHT WIRING CONNECTIONS

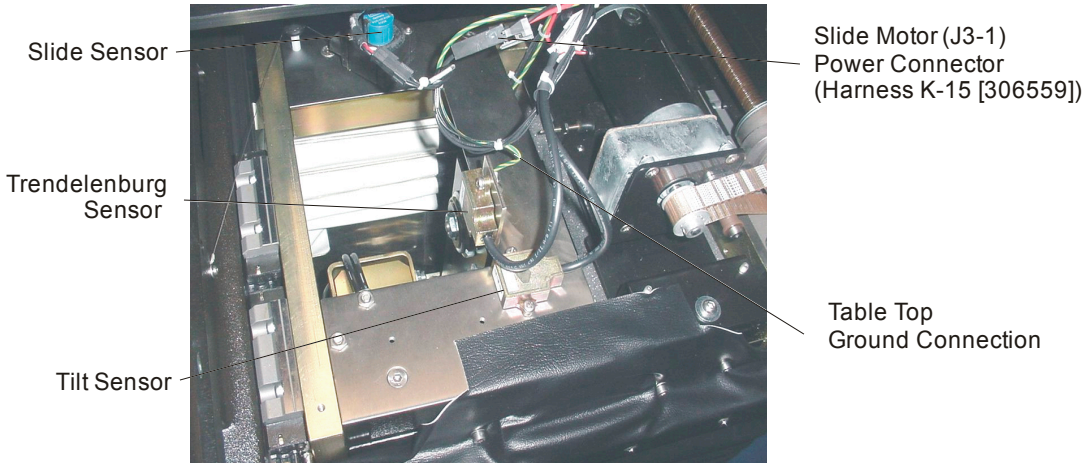


FIGURE 4-44. TOP OF COLUMN WIRING CONNECTIONS

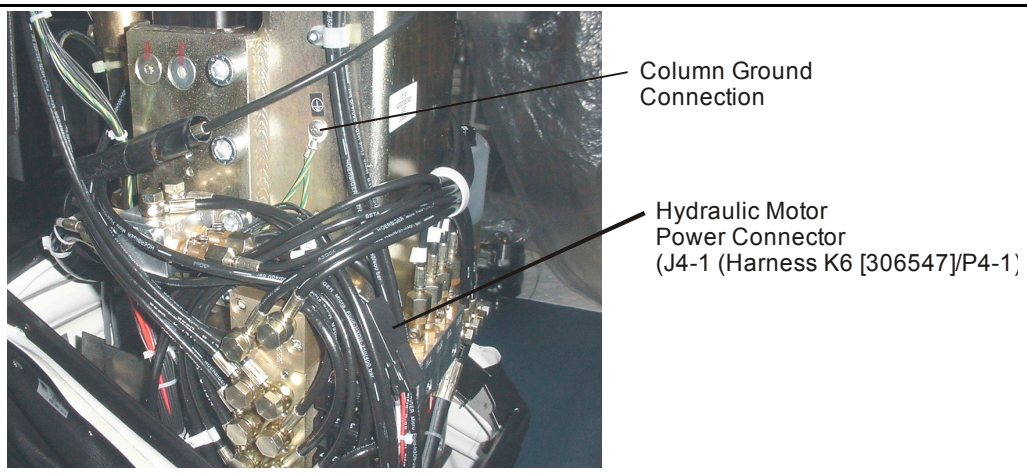


FIGURE 4-45. COLUMN HEAD SIDE CONNECTIONS

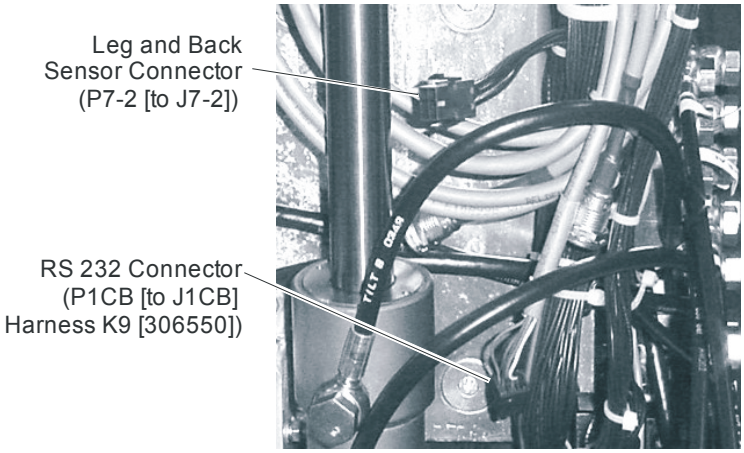


FIGURE 4-46. COLUMN LEFT SIDE CONNECTIONS

MECHANICAL SLIDE SYSTEM

The slide system uses a 24VDC motor to drive a timing belt which, in turn, activates a slide screw to slide the table top from head to foot (FIGURE 4-47). The DC motor is reversible by controlling the current direction, so no additional gearing is required to achieve bi-directional motion. The motor is secured in its mounting bracket by rubber isolators that prevent vibration transfer to the frame.

Components of the slide system were chosen for high reliability and to minimize maintenance requirements.

The motor provides high torque from a compact design to fit in the space under the table top. Its Class F insulation qualifies it for close proximity to other components while it promises a long service life.

Gears are bronze with permanently lubricated grease-filled bearings. The timing belt is steel cord reinforced urethane to minimize stretch and belt tensioning problems.

Two bolts connect the motor assembly to the table top frame. The motor and drive belt are field replaceable, but the slide gear screw and its associated support bearing and mounting are not.

The timing belt tension should be checked annually and adjusted as necessary.

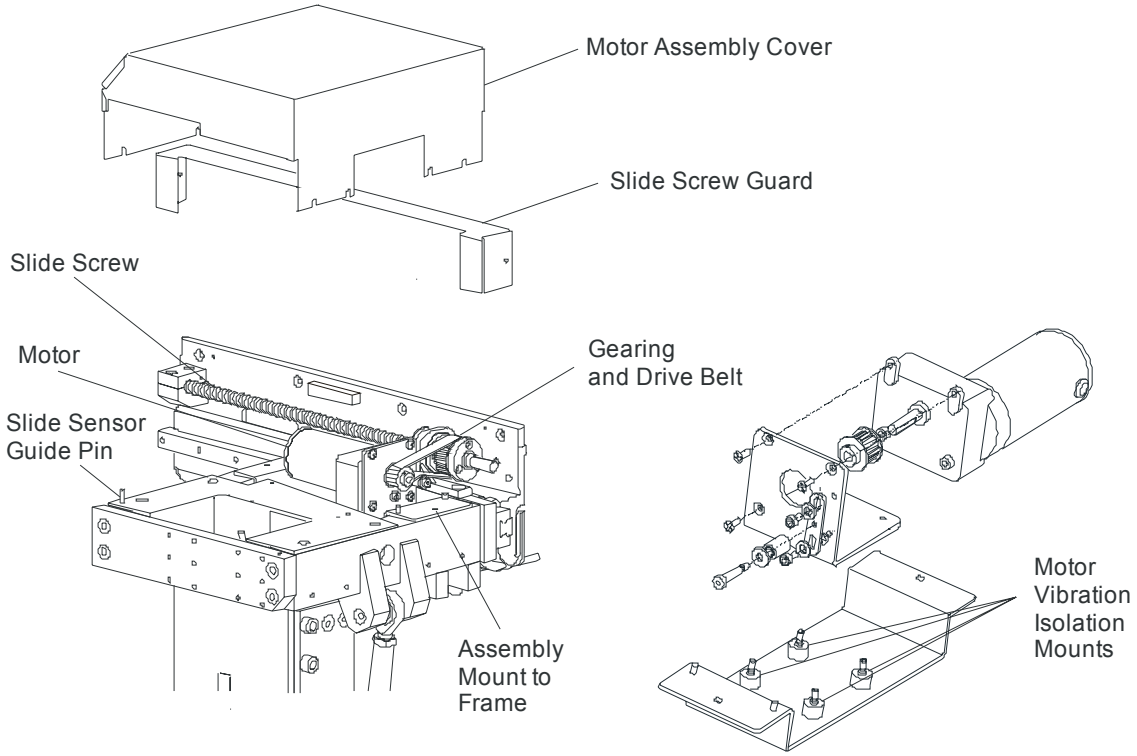


FIGURE 4-47. SLIDE MECHANISM COMPONENTS

Timing Belt Testing and Adjustment

Do the following to test the tensioning of the timing belt:

1. Remove the top cover and the motor cover.
2. Press down on the drive belt approximately mid way between the motor shaft and the slide screw (FIGURE 4-48).

   Use only finger pressure (approximately 3 psi).
3. The belt is properly tensioned if:
   - The belt does not deflect more than 0.25" (6mm) and
   - You cannot lift the belt from the pulleys.

If necessary, do this to adjust the tensioning:

1. Loosen both tensioning adjustment screws under the drive belt.
2. Move the tensioner pulley in its cam slot to adjust the tension.
   - Move the pulley toward the belt to increase the tension.
   - Move the pulley away from the belt to decrease the tension.
3. Tighten both tensioning adjustment screws.

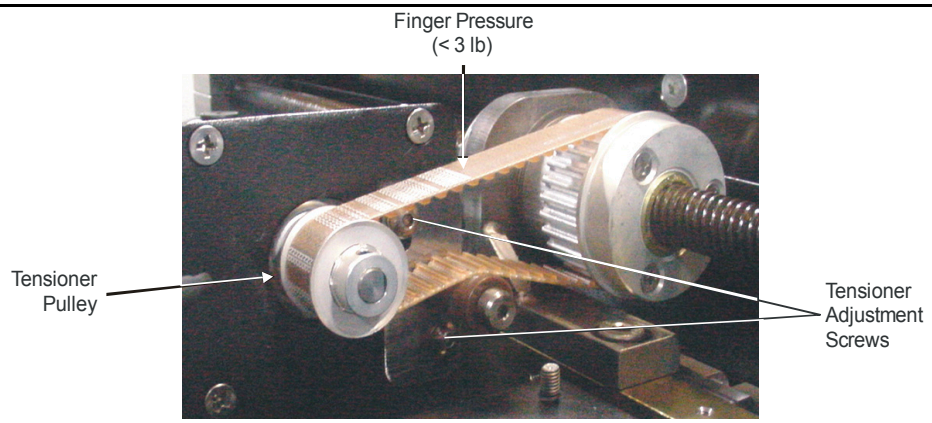


FIGURE 4-48. DRIVE BELT TENSION TESTING AND ADJUSTMENT

CIRCUIT DIAGRAMS

The following pages contain the hydraulic and electrical schematics for the Operon B 810 Surgical Table:

- Figure 5-1, C8 Hydraulic Schemati, see page 5-2
- Figure 5-2, Wiring Diagram, see page 5-3
- Figure 5-3, base wiring diagram, see page 5-8

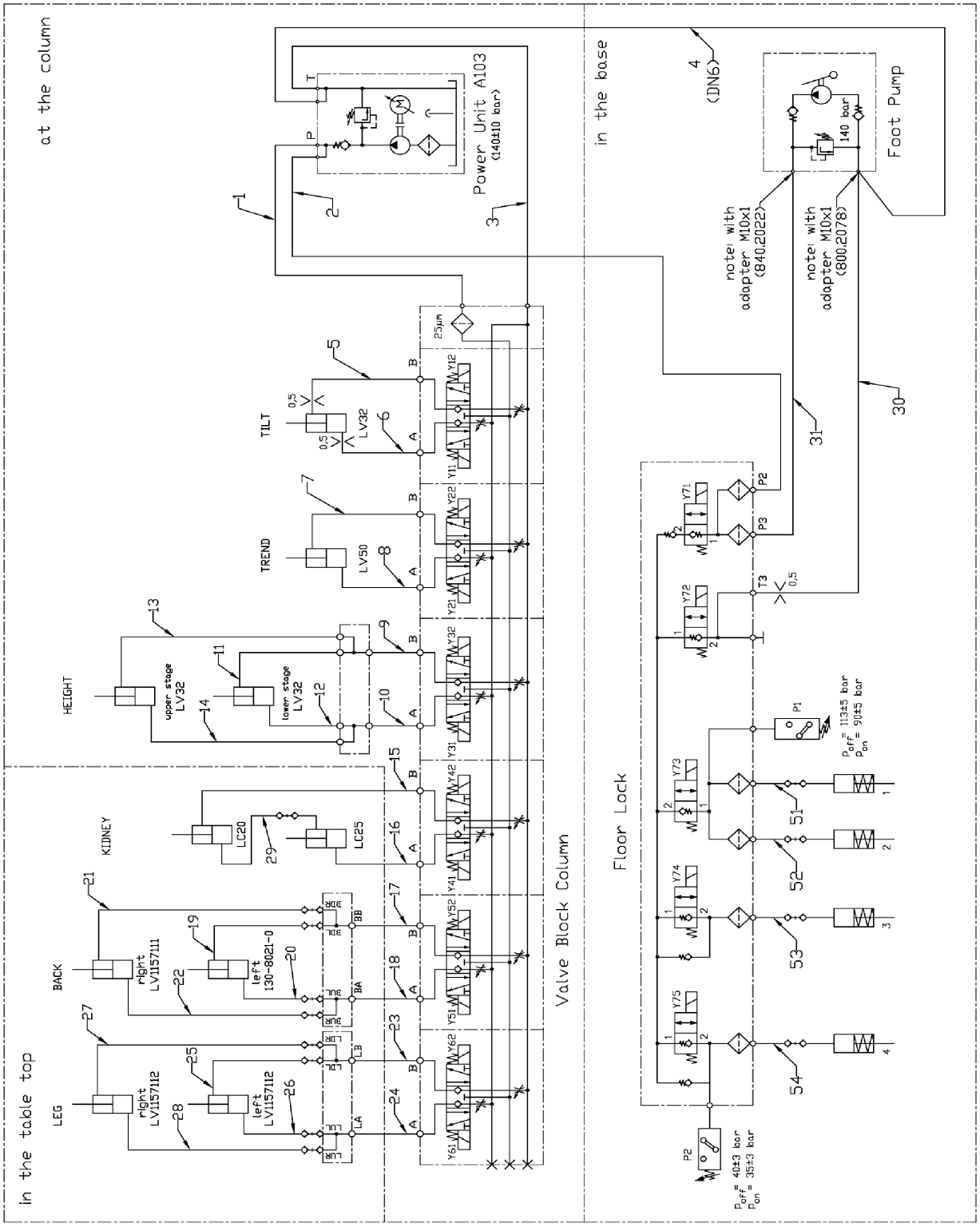


FIGURE 5-1. C8 HYDRAULIC SCHEMATIC

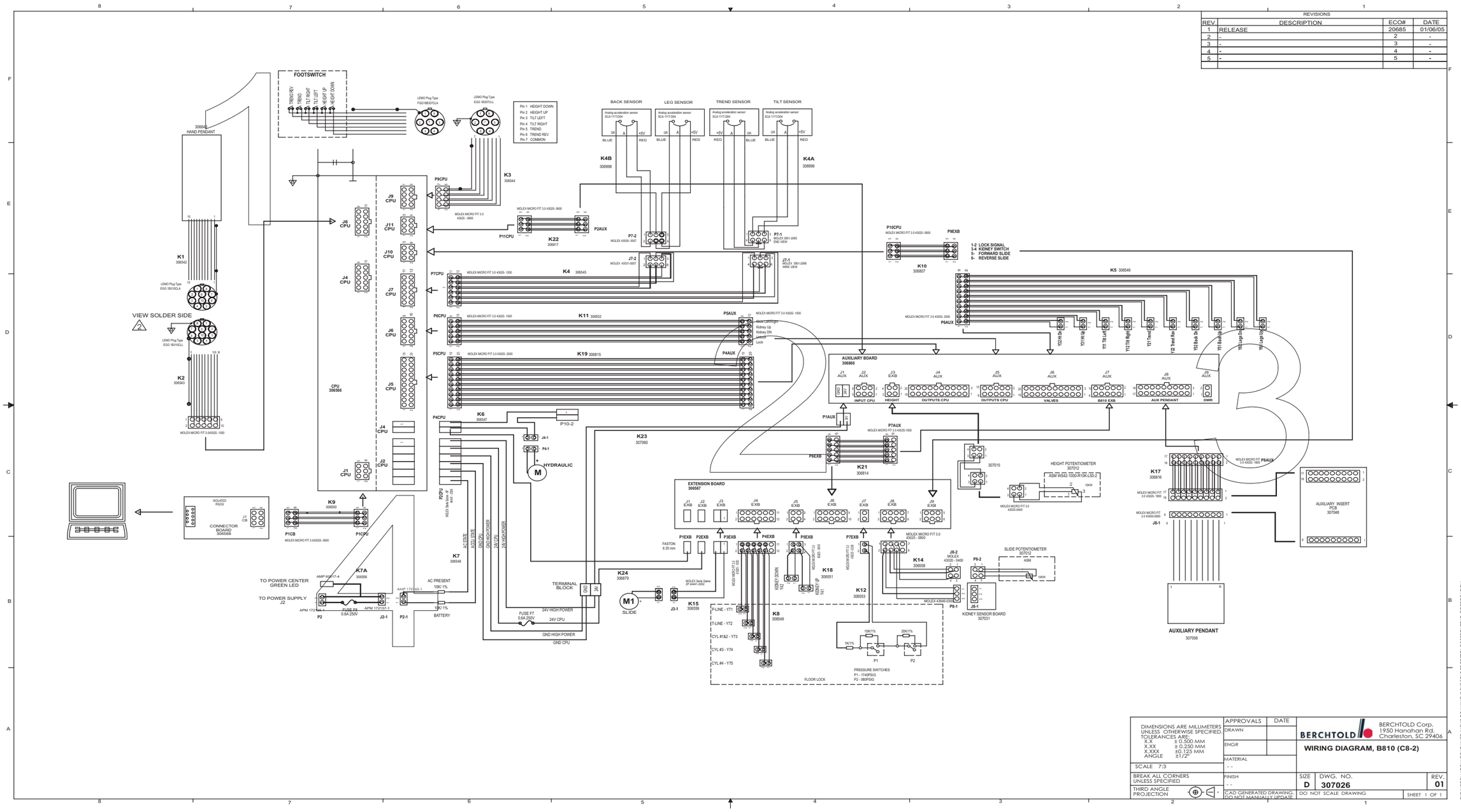


FIGURE 5-2. WIRING DIAGRAM

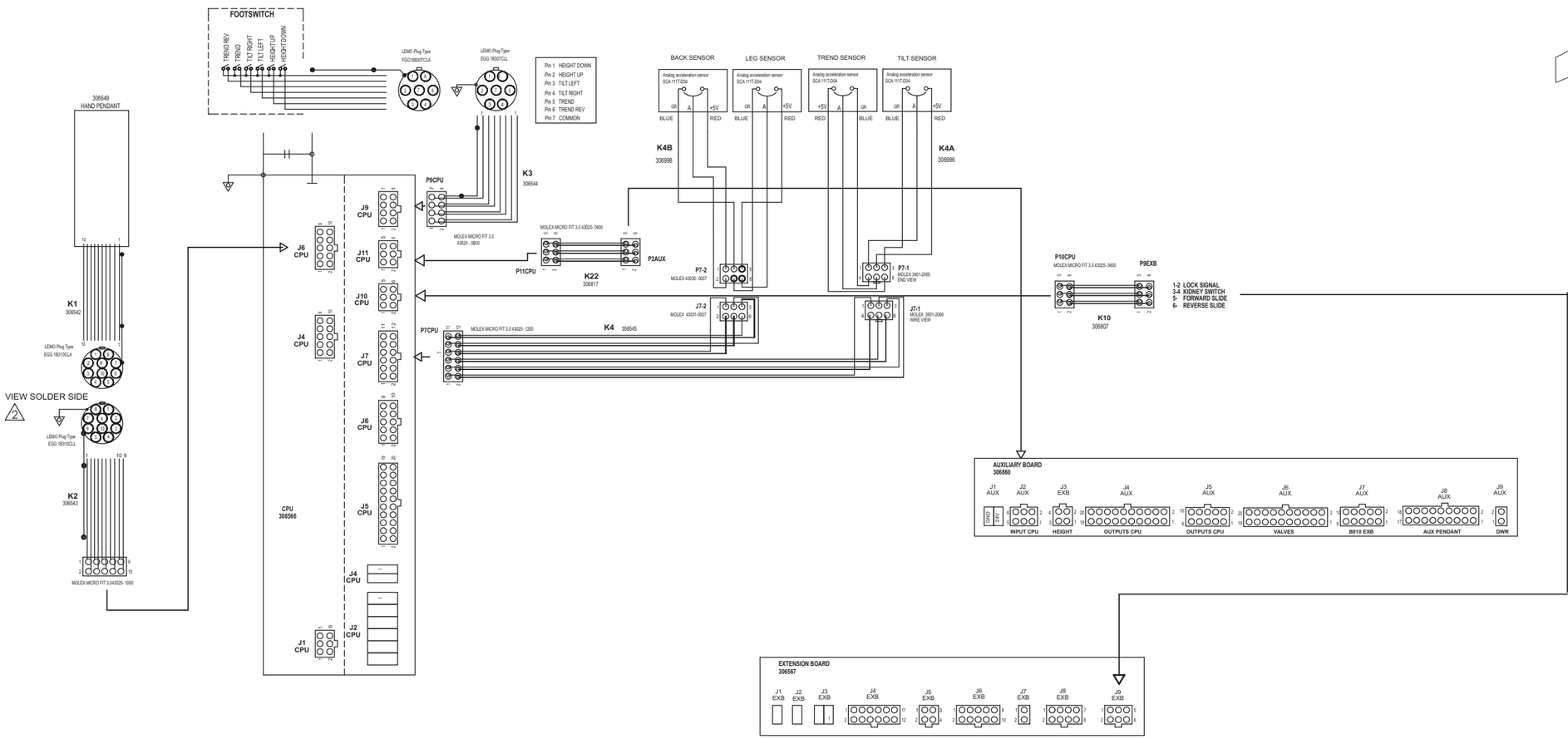
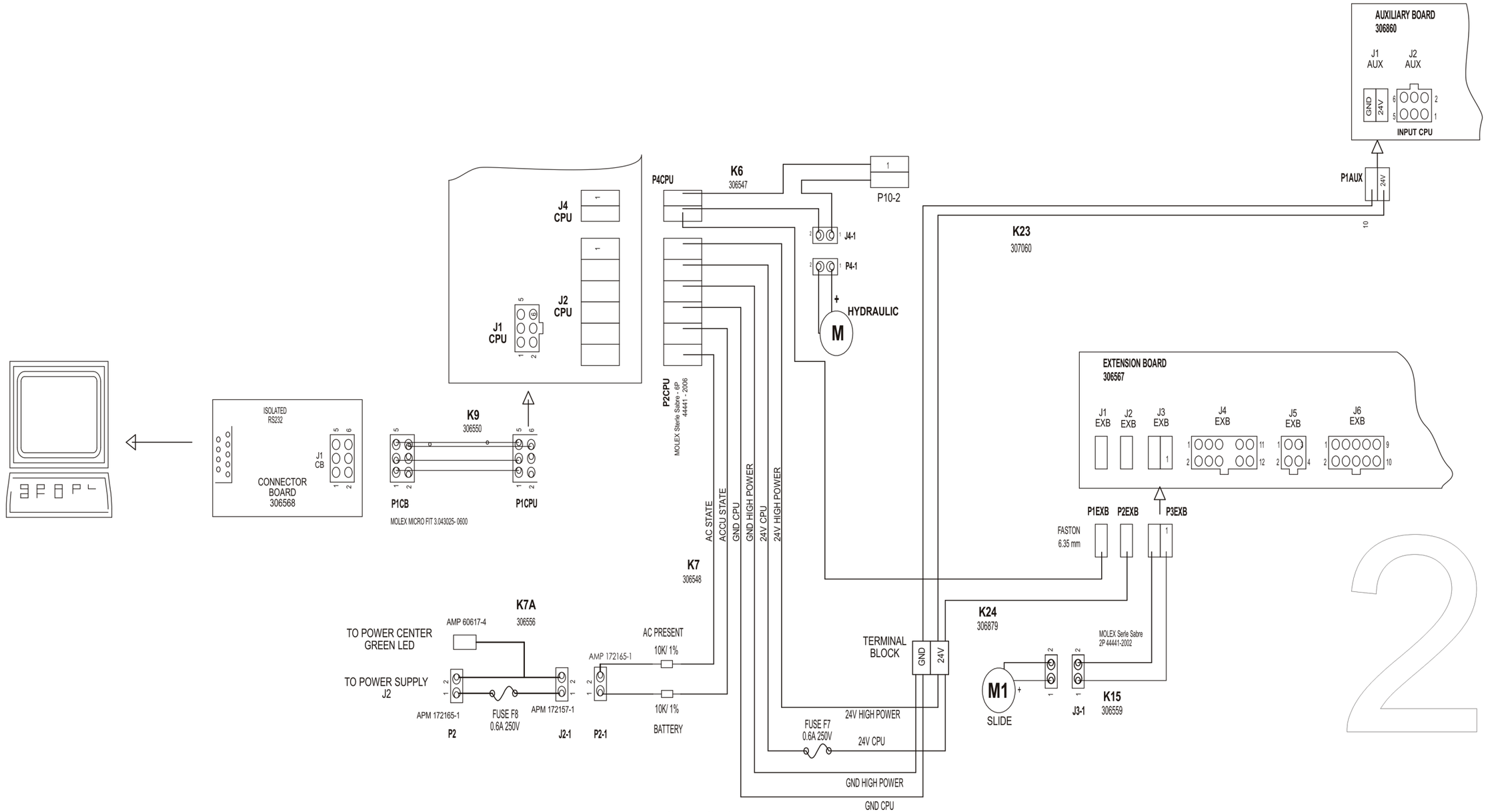
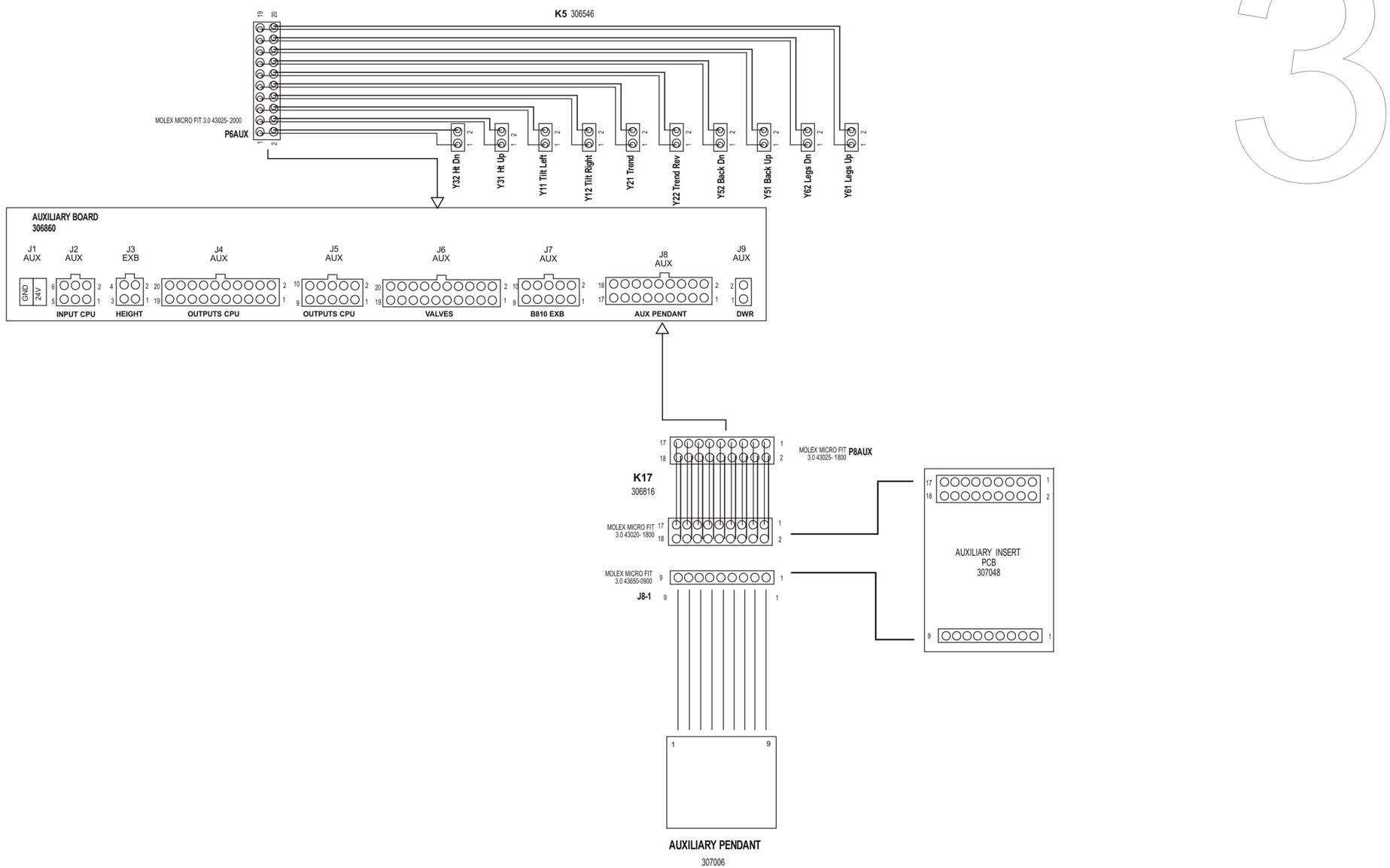


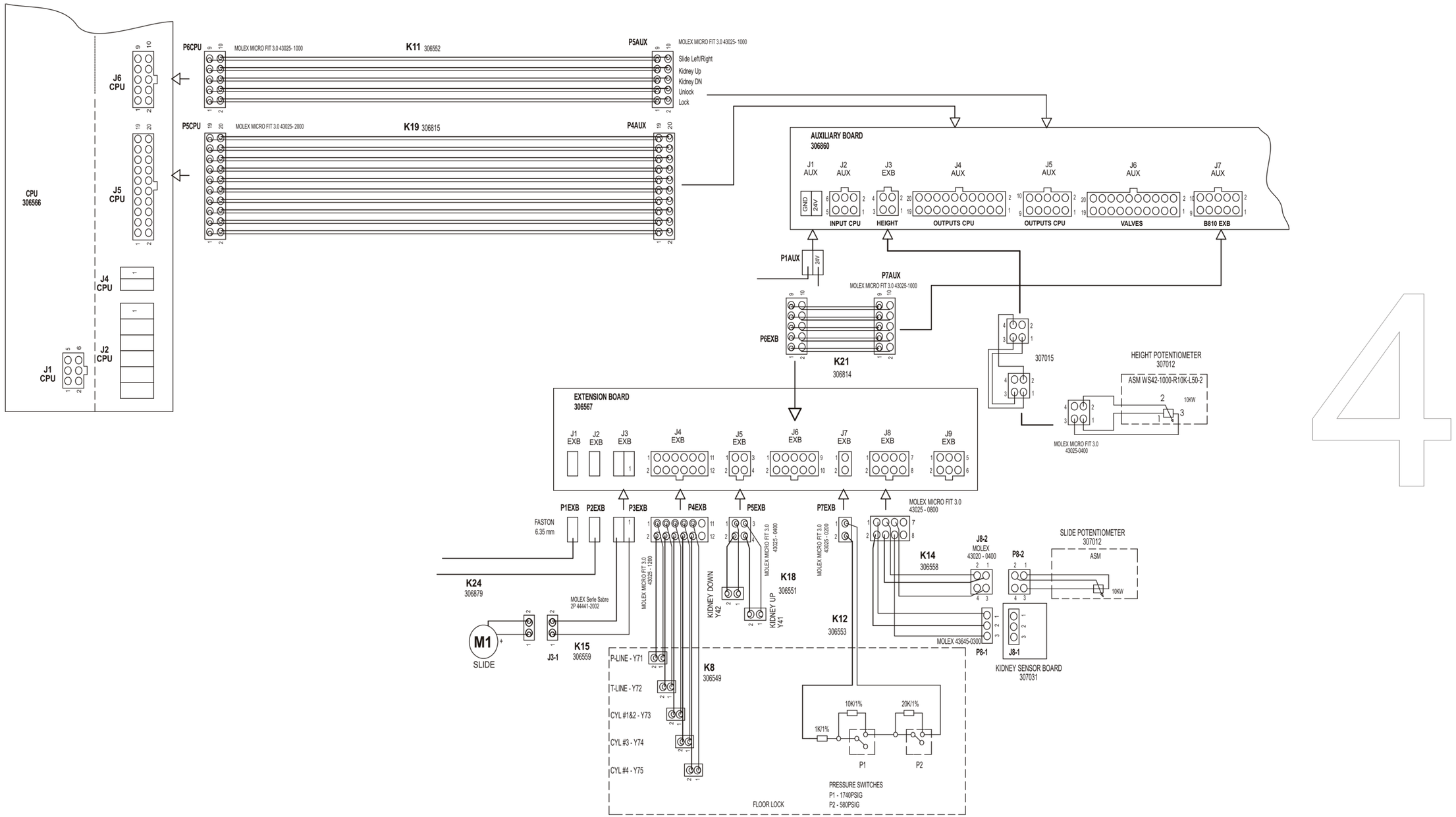
FIGURE 5-3. WIRING DIAGRAM: SHEET 1 DETAIL



WIRING DIAGRAM: SHEET 2 DETAIL



WIRING DIAGRAM: SHEET 3 DETAIL



WIRING DIAGRAM: SHEET 4 DETAIL

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20595	01/13/04
2	8A WAS 6A, 4A WAS 3A	20630	03/16/04
3	RED WAS BROWN, 2X	20697	06/07/04
4	ADD LINE FILTER	20738	10/08/04
5	REMOVED F5 FUSE AND PENDANT HARNESS	20683	12/07/04

TRANSFORMER ASSY
306510 (115VAC CONFIGURATION)

ASSY, POWER SUPPLY
306464

ASSY, POWER CENTER, RIGHT
304363

306930
AC
FILTER

TERMINAL STRIP

[115V OPER]
F1 8A/125V
F2 8A/125V

GROUNDING STUD

TRANSFORMER ASSY
306510 (230VAC CONFIGURATION)

[230V OPER]
F1 4A/250V
F2 4A/250V

JUMPER WIRE

GROUNDING FASTENER
BASE AT FOOT PUMP

POWER SUPPLY
GROUND

BATTERY STATE

AC PRESENT (12VDC)

J2
P2

24V LED
AC PRESENT

VDC
BATT V+
BATT V-
COM

TERMINAL BLOCK
304559

TO J2CPU PIN 1 (306548)
TO J2CPU PIN 2 (306548)
F7 0.60 AMP
SLO-BLO
TO J1AUX PIN 2 (306818)
TO J2CPU PIN 3 (306548)
TO J2CPU PIN 4 (306548)
TO J1AUX PIN 1 (306818)

F8
0.60 AMP
SLO-BLO

J2-1
TO HARNESS K7 P/O
306556

+VDC (SWITCH INPUT)
+VDC (SWITCH OUTPUT)

ASSY, POWER CENTER, LEFT
304364

CBI 20 AMP
F3 20 AMP
F4 20 AMP
BLANK
SPARE 20 AMP

EMERGENCY ON/OFF
BATTERY
PUMP

B1
BATTERY
+12VDC

B2
BATTERY
+12VDC

J10-2
TO HARNESS K6
306547

DIMENSIONS ARE MILLIMETERS UNLESS OTHERWISE SPECIFIED.
TOLERANCES ARE:

X.X	± 0.500 MM
X.XX	± 0.250 MM
X.XXX	±0.125 MM
ANGLE	±1/2°

SCALE 1:1

BREAK ALL CORNERS UNLESS SPECIFIED

THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN	
ENGR	
MATERIAL	
- -	
FINISH	
- -	
CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE	

BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29406

BASE WIRING DIAGRAM

B810

SIZE	DWG. NO.	REV.
B	306886	05

DO NOT SCALE DRAWING

SHEET 1 OF 1

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ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF BERCHTOLD IS PROHIBITED.

BASE WIRING DIAGRAM

SERVICE PROGRAM

INTRODUCTION

The service program is used both to set table parameters and to assist the technician in identifying and troubleshooting table problems.

The minimum requirements to run the service program are as follows:

- Windows 98/NT/2000/XP operating system
- Pentium x86 processor with 32 Mbyte RAM
- VGA video adapter with 800 X 600 pixel, 256 colors
- Microsoft compatible mouse
- Serial communication port with 9 pin sub d connector.

An RS232C (1 to 1) cable with a 9-pin sub-d male connector is required to connect to the table. The mating connector should be compatible with the user's PC serial COM port.

CPU DESCRIPTION

The CPU contains two separate microprocessors. Both microprocessors receive identical signals from the sensors, and the processors compare the signals to ensure that they are identical. Each of the processors calculates the action required to comply with signals from the hand pendants or foot switch, but only one of the microprocessors—designated the active computer—actually sends an executable command. The other processor serves as a backup computer in the event the active computer fails. The K2 cable must be moved from the J6 CPU connector to the J4 CPU connector to use the other CPU. (See Figure 5-2 for connection locations and harness identification.)

The CPU both monitors and controls all table movements based on signals from the sensors and switches mounted at various locations. These movements, shown in Figure 6-1, include:

A = Tilt
B = Trendelenburg
C = Back
D = Legs
E = Slide
F = Floor Lock

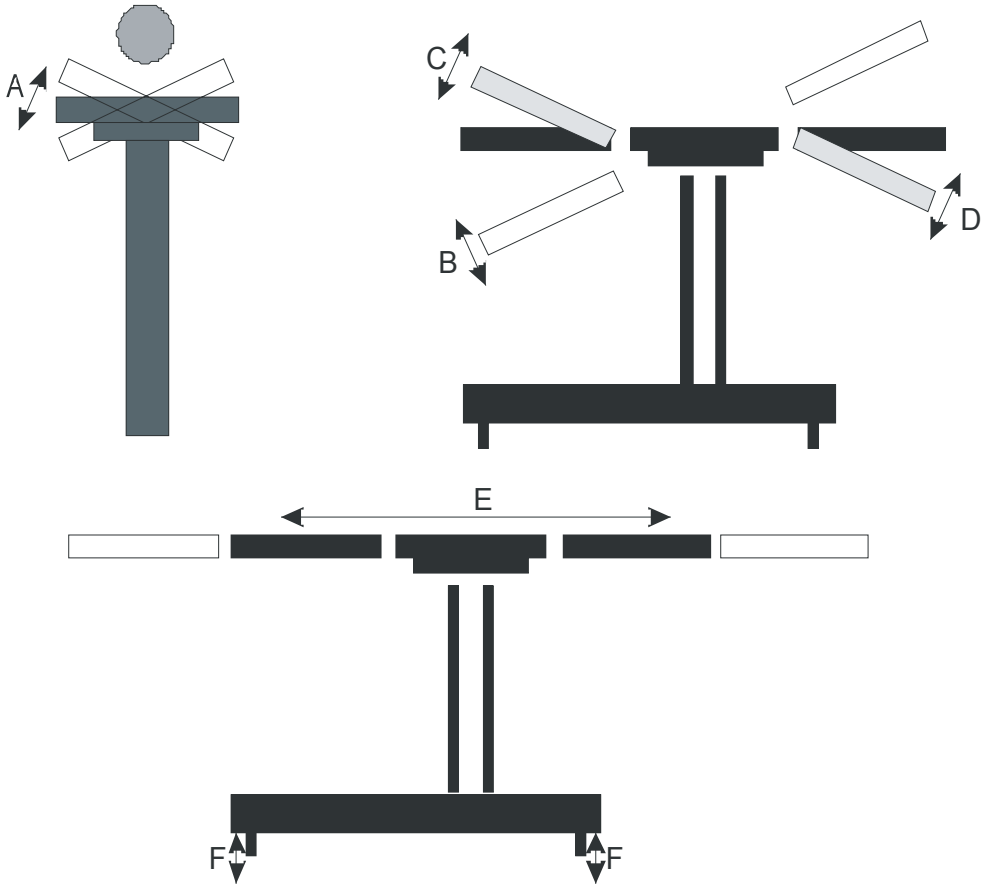


FIGURE 6-1. OPERON B 180 SURGICAL TABLE MOVEMENTS

The hydraulic system is a closed system that uses pressure to actuate both types of reciprocating motions. The software turns on the solenoids and the hydraulic motor, then monitors the response of the sensors to achieve the hydraulic motions commanded by the operator. This process is explained in detail under Principles of Operations in Section 5.

Similarly, the software turns on the motor that operates the slide mechanism and monitors the sensor that measures the motion.

The software is also responsible for monitoring and managing several system functions independent of the operator's input. These functions include the charging system, power system availability, and event recordkeeping.

HOW TO USE THE SERVICE PROGRAM

Connect to the Table

1. Connect the RS 232 data cable to your computer's COM 1 or COM 2 port.
2. Connect the other end of the data cable to the connector board on the right side of the table (Figure 6-2).
3. Turn the security screws on both of the plugs until they are finger tight.

NOTE

***NOTE**: — The table must be in a controls active mode (i.e., hand pendant active) for the service program to establish an interface with the CPU.*

4. If necessary, connect the table to an AC mains power supply.
5. Turn the table's main DC power switch to the ON position.
6. Press the ON button on the primary hand pendant. If the physical hand pendant is inoperative, you can use the virtual hand pendant that appears on your computer screen to turn the controls on.

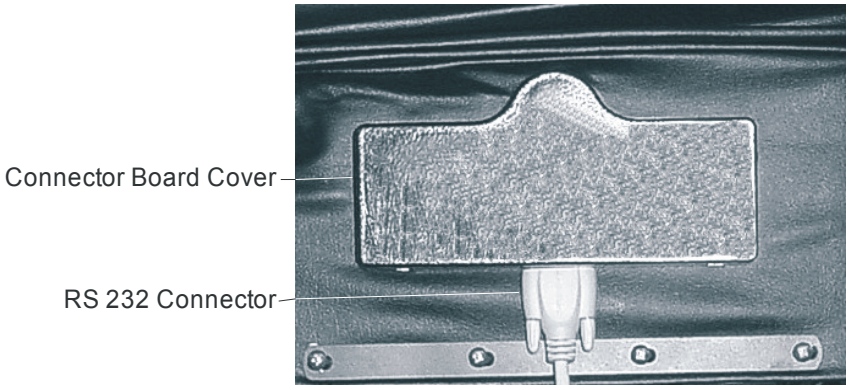


FIGURE 6-2. PC CONNECTION

Launch the Service Program

If you do not have the OPERON B 810 Service Program installed on your laptop computer, contact Berchtold Technical Service for instructions.

1. Double click the service program icon on the computer's desktop. Alternatively, you can select the *OPERONB810* program file from the start menu, and press enter.

NOTE

***NOTE**: — The first letter of the password must be capitalized. All other letters must be lower case.*

2. Enter the service password, then click OK or press enter (Figure 6-3).

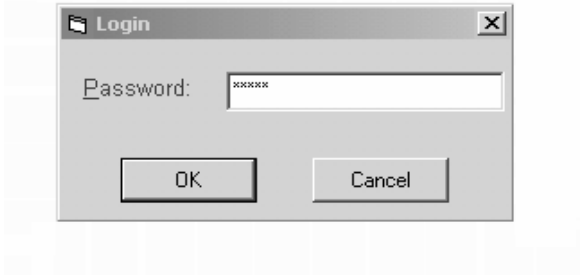


FIGURE 6-3. LOGIN FORM

The following will appear on your screen (in addition to your other desktop icons) (Figure 6-4).

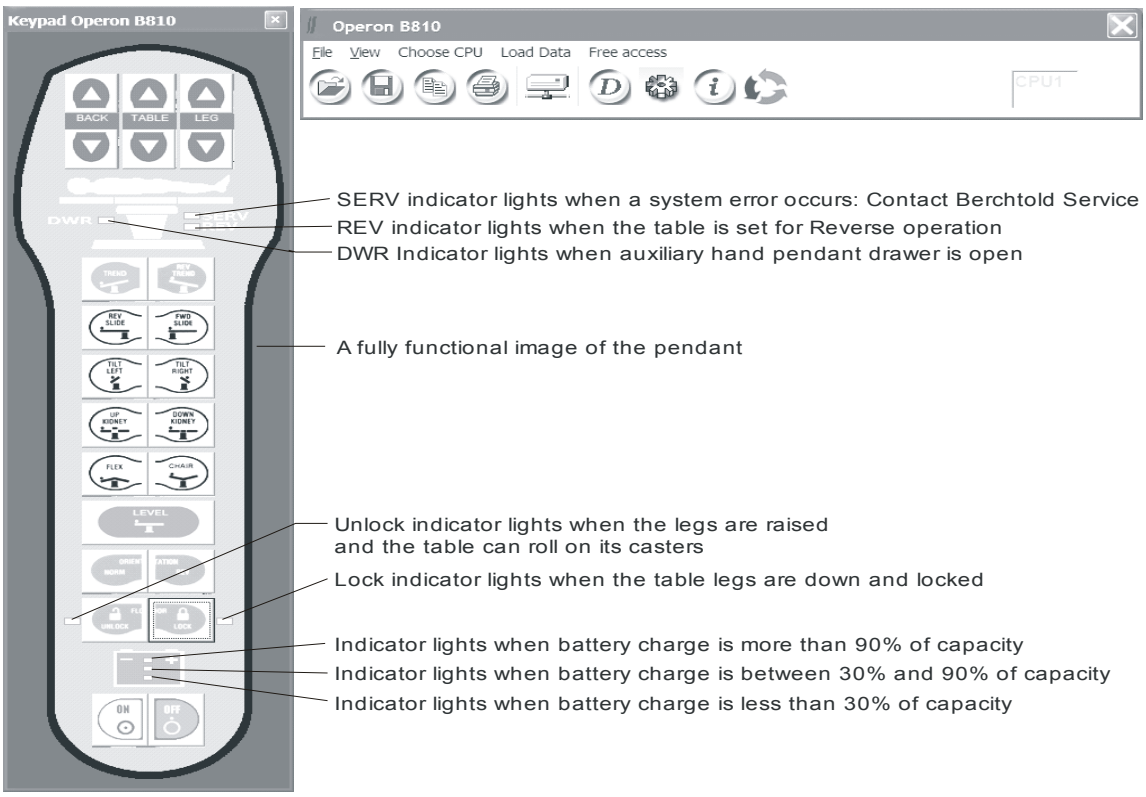

Keypad Operon B810
Operon B810
File View Choose CPU Load Data Free access
CPU1
SERV indicator lights when a system error occurs: Contact Berchtold Service
REV indicator lights when the table is set for Reverse operation
DWR Indicator lights when auxiliary hand pendant drawer is open
A fully functional image of the pendant
Unlock indicator lights when the legs are raised and the table can roll on its casters
Lock indicator lights when the table legs are down and locked
Indicator lights when battery charge is more than 90% of capacity
Indicator lights when battery charge is between 30% and 90% of capacity
Indicator lights when battery charge is less than 30% of capacity

FIGURE 6-4. SERVICE PROGRAM MAIN MENU SCREEN PENDANT INDICATORS

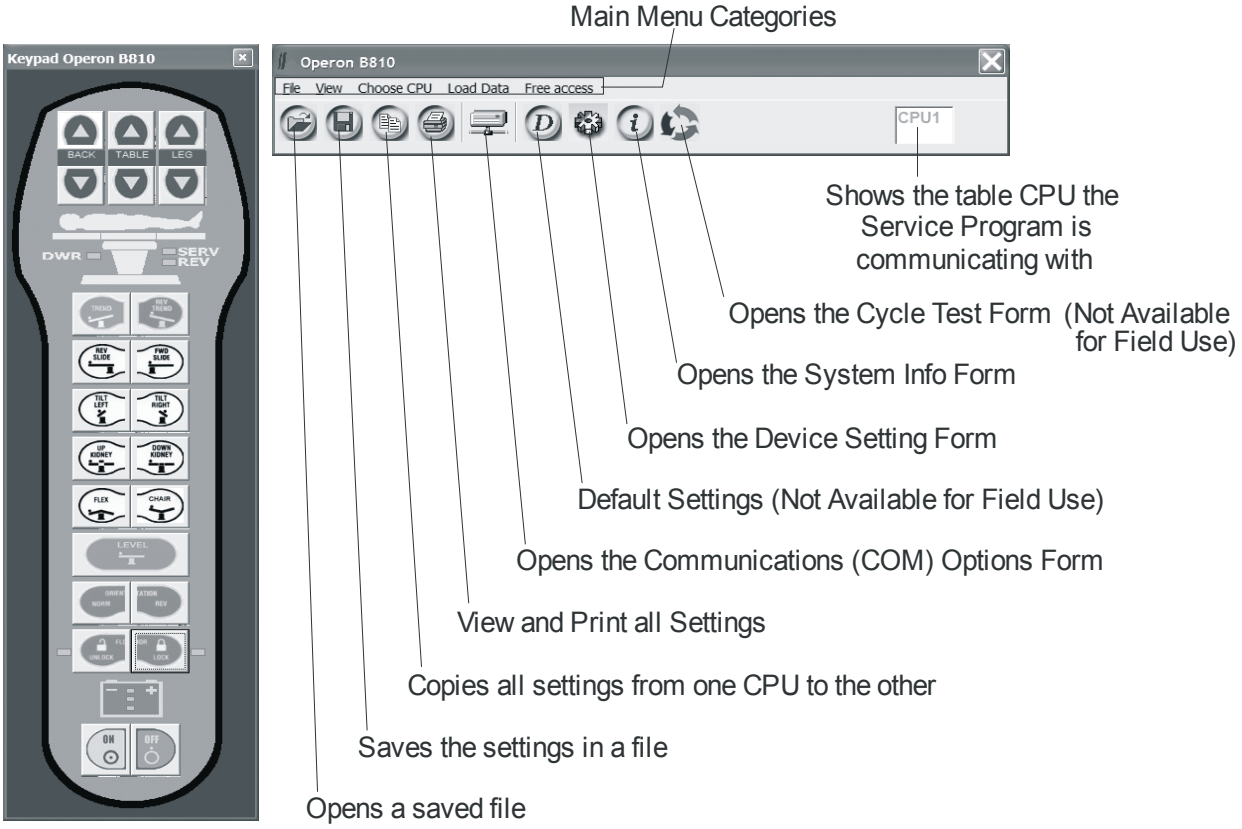

Main Menu Categories
Keypad Operon B810
Operon B810
File View Choose CPU Load Data Free access
CPU1
Shows the table CPU the Service Program is communicating with
Opens the Cycle Test Form (Not Available for Field Use)
Opens the System Info Form
Opens the Device Setting Form
Default Settings (Not Available for Field Use)
Opens the Communications (COM) Options Form
View and Print all Settings
Copies all settings from one CPU to the other
Saves the settings in a file
Opens a saved file

FIGURE 6-5. SERVICE PROGRAM MAIN MENU SCREEN MENU OPTIONS

The hand pendant graphic and .each of the menu options are explained below.

The Hand Pendant Graphic

The hand pendant graphic is a virtual hand pendant. It functions exactly the same as the real hand pendant that is physically attached to the table.

Do this to operate the graphic pendant:

1. Place your mouse pointer over any pendant button.
2. Click and hold down your left mouse button to activate the graphic button.

The graphic pendant serves two functions:

1. It allows you to operate all table functions from your computer while you watch the readings in the different forms.
2. If the table functions from the screen pendant button, but not from the physical pendant button, you know that the physical pendant or wiring needs to be replaced. In other words, the failure of the table to perform some function is related to a problem with the pendant or wiring rather than a problem with the table control system.

NOTE

***NOTE**: — The hand pendant automatic shutdown feature is inactivated during the time that the service program is connected to the CPU. If you need to disable the hand pendant for testing purposes, you must use the OFF button on either the physical or virtual hand pendant.*

The Service Program Menus

The following text and graphics describe the options available to the customer or field technician on the menu bar (Figure 6-6). Several of the options listed are grayed out. This means that they are not available for field service use.

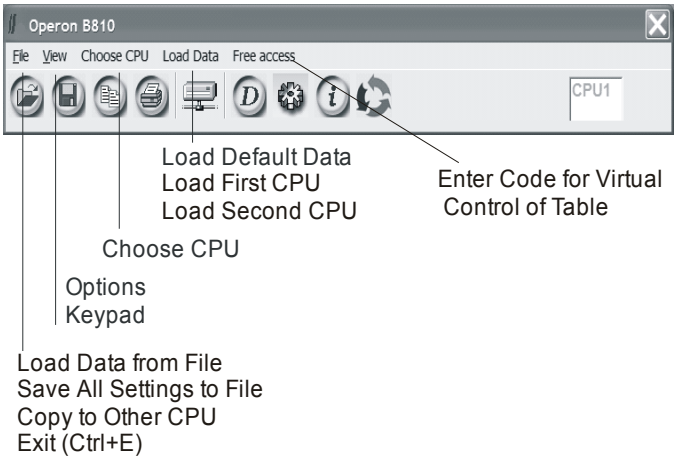


FIGURE 6-6. FILE MENU OPTIONS

NOTE

***NOTE:** — In order to select the menu choices with the ALT+ initial letter, the menu bar must be active. The menu bar is active if the top of the bar is blue. If the top of the bar is gray, place your cursor on the bar and click.*

File Menu

The *File* menu offers only one choice for field service applications: Exit

- Selecting this option exits from the OPERONB810 Service Program.
- You do not receive a warning or prompt before the program shuts down.
- Selecting this option removes all OPERONB810 Service Program icons from the desktop, including the main menu, the graphic pendant, and any forms that you may have opened.
- New settings in any form will not be automatically saved on exit. You must use the form's save command to save any new settings.
- You can select the exit option by using the CTRL+E short cut.
- You can select the exit option by clicking on the "X" box on the right corner of the menu bar.

View Menu

The *View* menu offers you two choices:

1. Options
   - Selecting this option brings up the COM setting form.
   - See the "COM" icon, and description below, for an explanation of how to set the COM options.
2. Keypad
   - Selecting this option toggles the graphic pendant on and off.
   - The graphic pendant is displayed when a checkmark (✔) appears beside the selection.

Choose CPU Menu

This function allows the user to operate the service software either through CPU1 or CPU2. This does not change the CPU that the primary hand pendant uses.

Load Data Menu

This option allows the user to read the default setting, the settings programmed in CPU1, or the settings programmed in CPU2.

Selecting this option loads the default data (i.e., parameter settings) into the active CPU.

Free Access Menu

This option prompts the user for a "Key-Code" for virtual control of table functions. This is a purchased feature, please see your BERCHTOLD Corporation Sales/Service Representative.

Open File Button

Clicking the Open File button results presents a standard Windows Open File screen (Figure 6-7).

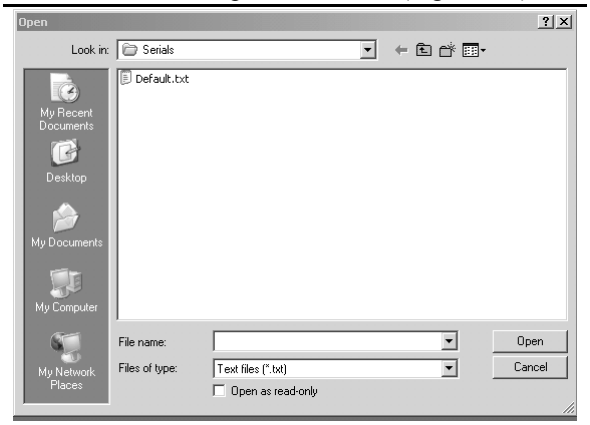


FIGURE 6-7. WINDOWS FILE OPEN SELECTION SCREEN

Save File Button

Clicking the Save File button results presents a standard Windows File Save screen (Figure 6-8).

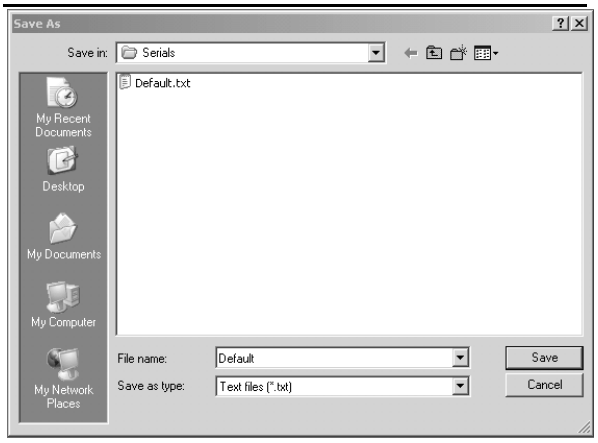
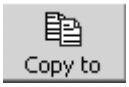


FIGURE 6-8. WINDOWS FILE SAVE SCREEN



Copy to Button

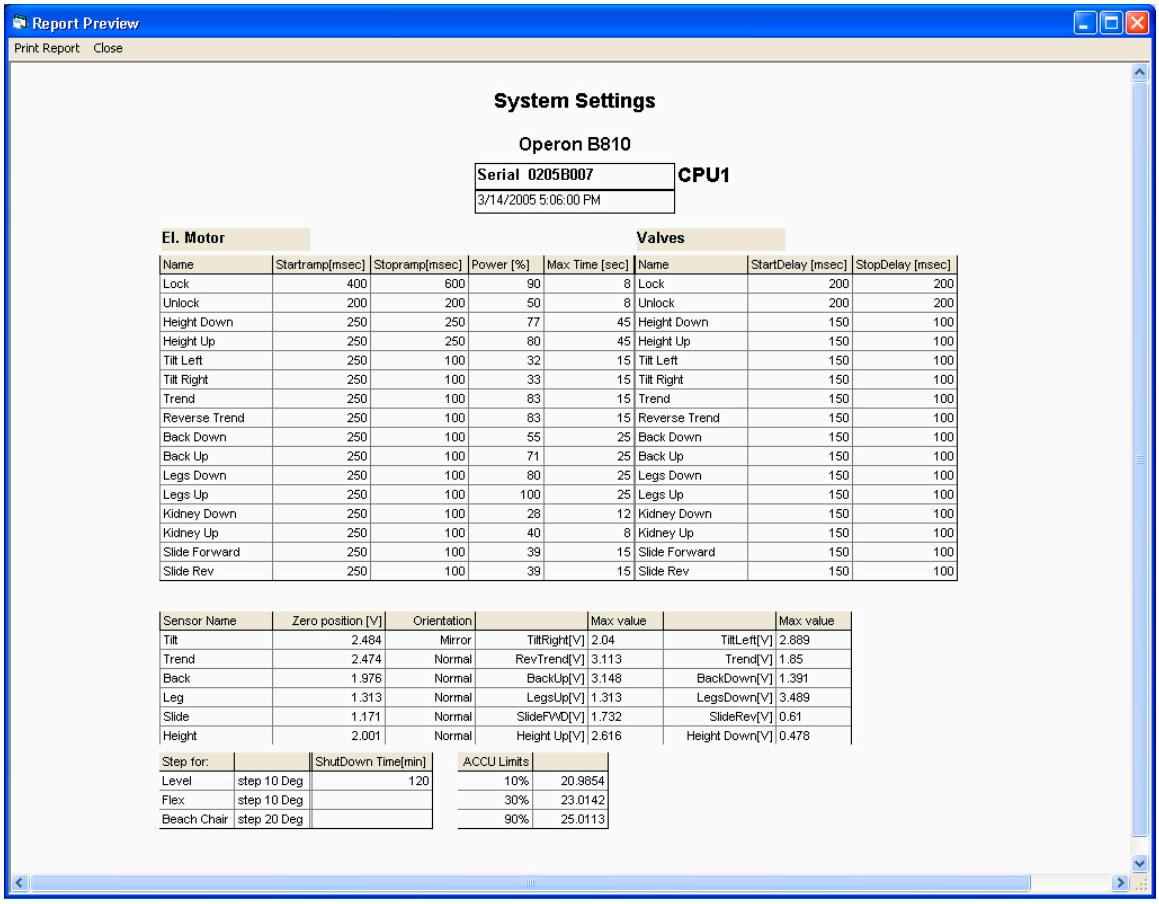
The copy to button is inactive in the customer and field service versions of the service program.

Factory technicians use the Copy to button to copy the contents of the current CPU to the other CPU.

You should use this function any time you make any change in the table's programming or settings. It is important that both CPUs contain the same operating instructions so that the operators always know what to expect while using the table.

The print system setting button prints the contents of a file or screen form to your Windows default printer.

Print System Settings Button



Name	Startramp[msec]	Stopramp[msec]	Power [%]	Max Time [sec]	Name	StartDelay [msec]	StopDelay [msec]
Lock	400	600	90	8	Lock	200	200
Unlock	200	200	50	8	Unlock	200	200
Height Down	250	250	77	45	Height Down	150	100
Height Up	250	250	80	45	Height Up	150	100
Tilt Left	250	100	32	15	Tilt Left	150	100
Tilt Right	250	100	33	15	Tilt Right	150	100
Trend	250	100	83	15	Trend	150	100
Reverse Trend	250	100	83	15	Reverse Trend	150	100
Back Down	250	100	55	25	Back Down	150	100
Back Up	250	100	71	25	Back Up	150	100
Legs Down	250	100	80	25	Legs Down	150	100
Legs Up	250	100	100	25	Legs Up	150	100
Kidney Down	250	100	28	12	Kidney Down	150	100
Kidney Up	250	100	40	8	Kidney Up	150	100
Slide Forward	250	100	39	15	Slide Forward	150	100
Slide Rev	250	100	39	15	Slide Rev	150	100

Sensor Name	Zero position [V]	Orientation		Max value		Max value
Tilt	2.484	Mirror	TiltRight[V]	2.04	TiltLeft[V]	2.889
Trend	2.474	Normal	RevTrend[V]	3.113	Trend[V]	1.85
Back	1.976	Normal	BackUp[V]	3.148	BackDown[V]	1.391
Leg	1.313	Normal	LegsUp[V]	1.313	LegsDown[V]	3.489
Slide	1.171	Normal	SlideFWD[V]	1.732	SlideRev[V]	0.61
Height	2.001	Normal	Height Up[V]	2.616	Height Down[V]	0.478

Step for:		ShutDown Time[min]
Level	step 10 Deg	120
Flex	step 10 Deg	
Beach Chair	step 20 Deg	

ACCU Limits	
10%	20.9854
30%	23.0142
90%	25.0113

FIGURE 6-9. SYSTEM SETTINGS SCREEN

COM Button

Clicking the *COM* button causes the COM Options setting form to appear (Figure 6-10).

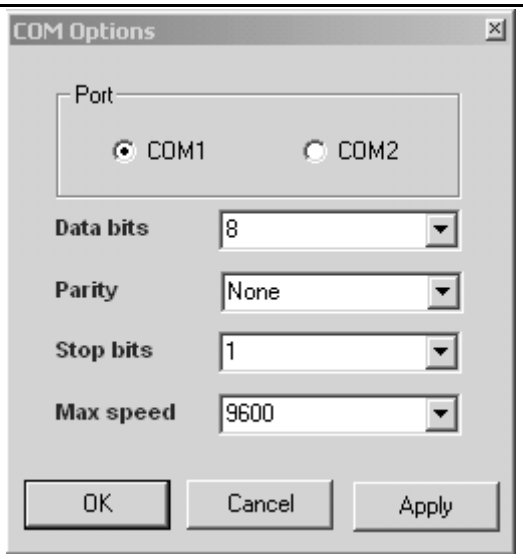


FIGURE 6-10. COM OPTIONS SETTING FORM

Normally, the communications settings between your computer and the table's CPU will be set automatically during the Service Program installation process. Should you wish or need to change any of the settings manually, this form provides all of the options available.

1. Click on the COM Port you wish to use: COM 1 or COM 2.
2. Select the number of Data bits to be sent. Your choices are:
   - 4
   - 5
   - 6
   - 7
   - 8
3. Select the Parity setting to be used. Your choices are:
   - None
   - Even
   - Odd
   - Mark
   - Space
4. Select the number of Stop bits to be used to separate data bits. Your choices are:
   - 1
   - 1,5
   - 2
5. Select the Max(imum communications) speed. Your choices are:
   - 2400
   - 4800
   - 9600
   - 19200

If you change your mind on any setting, go back and modify it.

If you decide to leave the settings as they are, click on the "Cancel" button. Alternatively, you can click on the "X" button in the upper right corner. Either of these actions will close the form.

To apply the settings for this session, click on the "Apply" button.

Clicking on "Apply" will leave the form open. If you wish to test you settings, click "Apply", then perform one of the other tasks through the Service Program to see how the settings perform.

Once you have the settings the way you want them, click on "OK" to save them and exit the COM Options form.

Load Default Settings Button

This button is inactive in customer and field service versions of the service program.

Device Settings Button

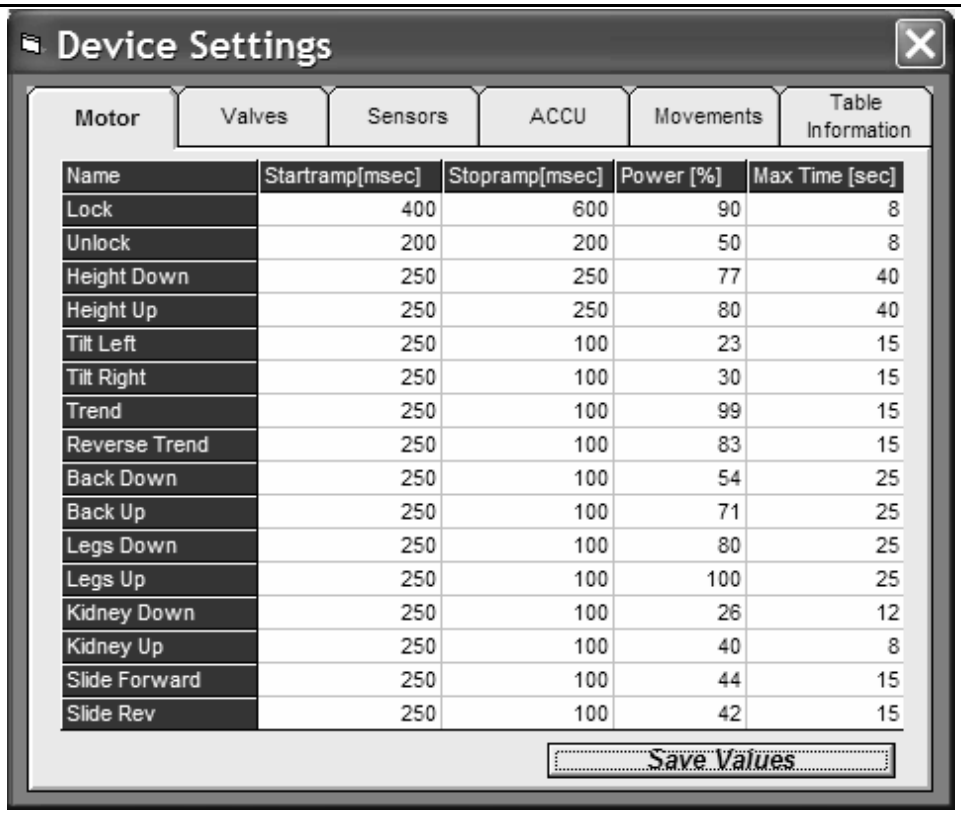
Clicking the Device Settings button causes the Settings Forms to appear. The Settings Forms are organized on six tabs (Figure 6-11):

1. Motor
2. Valves
3. Sensors
4. ACCU (Battery)
5. Movements
6. Table Information

To display the parameters for the function you wish to change, click on the tab to bring it forward and make it active.

NOTE

NOTE: *— The values shown in the illustration may not match those for your table.*



Name	Startramp[msec]	Stopramp[msec]	Power [%]	Max Time [sec]
Lock	400	600	90	8
Unlock	200	200	50	8
Height Down	250	250	77	40
Height Up	250	250	80	40
Tilt Left	250	100	23	15
Tilt Right	250	100	30	15
Trend	250	100	99	15
Reverse Trend	250	100	83	15
Back Down	250	100	54	25
Back Up	250	100	71	25
Legs Down	250	100	80	25
Legs Up	250	100	100	25
Kidney Down	250	100	26	12
Kidney Up	250	100	40	8
Slide Forward	250	100	44	15
Slide Rev	250	100	42	15

FIGURE 6-11. DEVICE SETTING FORM TABS

Motor Tab

The Motor tab allows you to set speed at which the table will perform the various movements (Figure 6-12). It is important to note that you can set opposing actions to operate at different speeds. Thus, for example, height up can be set to move slowly to give precise operator control, while height down can be set to move rapidly at the end of a procedure.

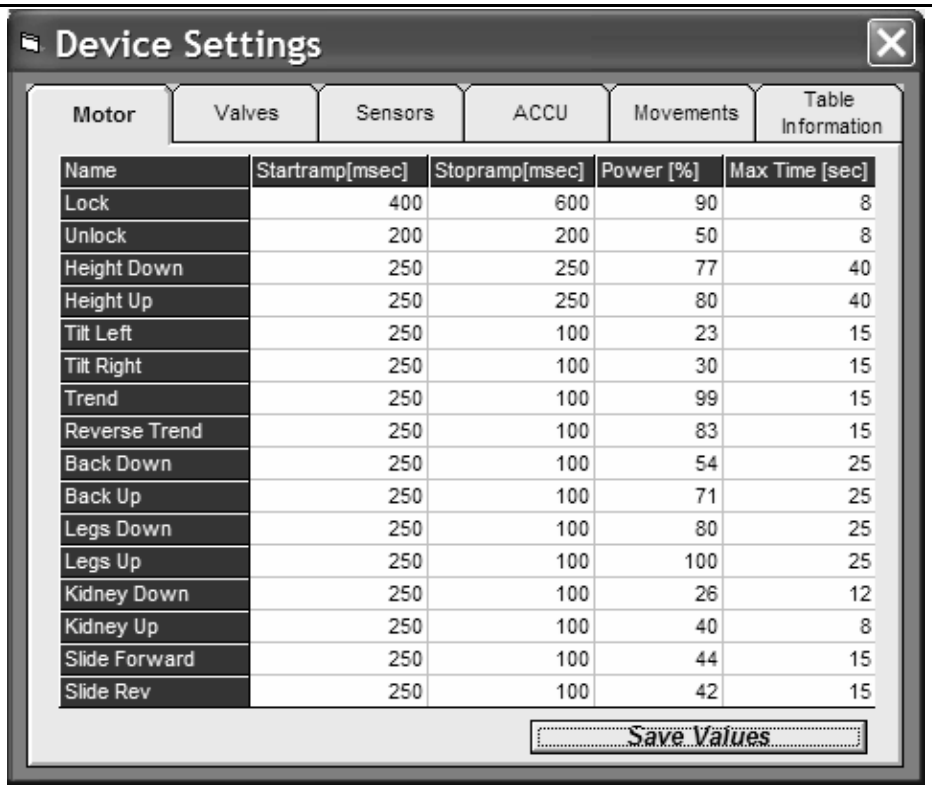
The following parameters can be set for each movement:

- Startramp (msec)
  This value is the amount of time (in milliseconds) it takes from the time the operator pushes a hand pendant button until the motor reaches full power setting. In effect, it is a ramp up time to achieve a smooth start to the motion. The startramp time should not be set above 1000 msec.
- Stopramp (msec)
  This value is the amount of time (in milliseconds) it takes from the time the operator releases a hand pendant button until the motor reaches 0 V power. In effect, it is a ramp down time to achieve a smooth stopping motion. The stopramp time should not e set above 1000 msec.
- Power (%)
  This is the percentage of motor's power used during the movement. The amount of power applied equates directly to the speed with which the motion is performed. Power may be set between 20 and 100% of the motor's full power.
- Max. Time (sec)
  This is the maximum amount of time (in seconds) the table is allowed to try to perform the movement. If the movement is not complete at the end of the time period, the motor shuts off.

CAUTION —*The Service Program will allow you to set motor parameters to the min. and max. values of 100 to 1000. Setting the parameters to the extreme min. or max. value could lead to damage to the table or its components, including a failure to operate. Always test your settings to ensure that the table responds as anticipated.*

To set the value of the parameter, use your cursor to highlight the number you wish to change. Type in the new value to replace the old value.

After setting all of the parameters to the desired levels, click on the "Save Values" button to record them in the table's active CPU. Be sure to save the changes to both CPUs.



Name	Startramp[msec]	Stopramp[msec]	Power [%]	Max Time [sec]
Lock	400	600	90	8
Unlock	200	200	50	8
Height Down	250	250	77	40
Height Up	250	250	80	40
Tilt Left	250	100	23	15
Tilt Right	250	100	30	15
Trend	250	100	99	15
Reverse Trend	250	100	83	15
Back Down	250	100	54	25
Back Up	250	100	71	25
Legs Down	250	100	80	25
Legs Up	250	100	100	25
Kidney Down	250	100	26	12
Kidney Up	250	100	40	8
Slide Forward	250	100	44	15
Slide Rev	250	100	42	15

FIGURE 6-12. MOTOR SETTINGS FORM

Valve Tab

The valve tab allows you to control the amount of time that the hydraulic valves open before the motor starts pumping fluid (Figure 6-13). Opening the valves too early could allow the table to move a perceptible amount before the motor activates to provide positive control over the movement.

The following delay can be set for each movement:

- Start Delay (msec)
  This is the time the processor waits after opening the valve before starting the hydraulic motor.
- Stop Delay (msec)
  This is the time the processor waits to close the valve after the hydraulic motor has stopped.

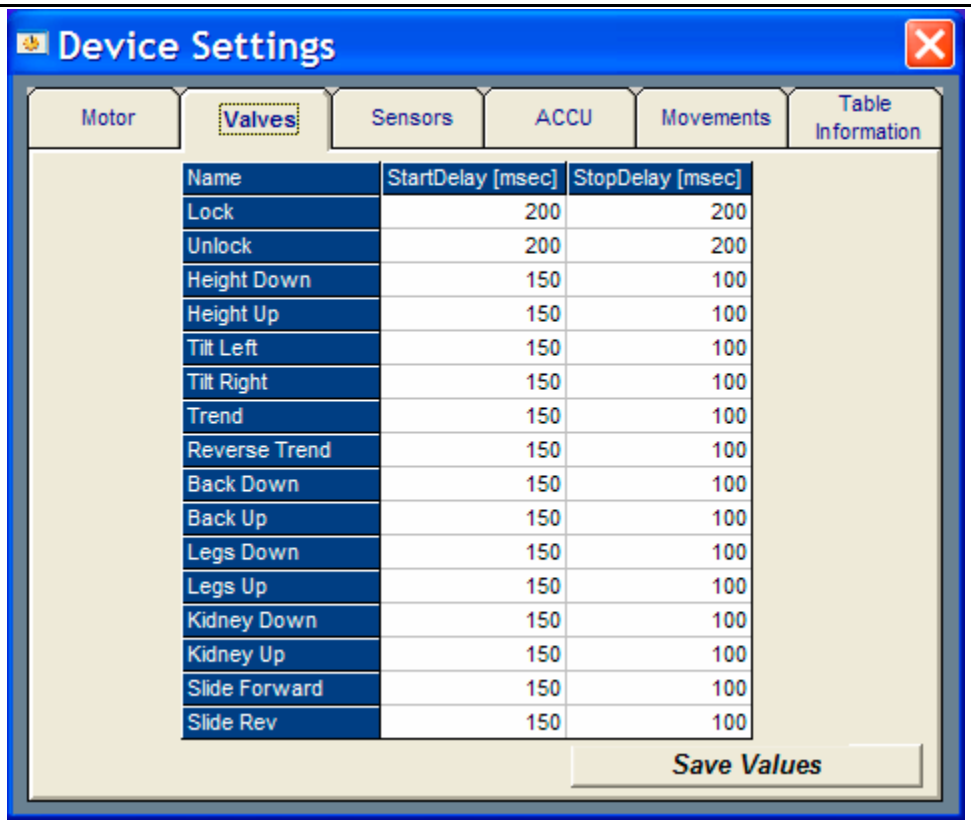
Motor Power settings can be adjusted in the range of 15-100%.

CAUTION

CAUTION *—The Service Program will allow you to set valve parameters outside the min and max range of 100-300MSec. This could lead to damage to the table or its components, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

To set the value of the parameter, use your cursor to highlight the number you wish to change. Type in the new value to replace the old value.

After setting all of the parameters to the desired levels, click on the "Save parameters" button to record them in the table's CPU.



Name	StartDelay [msec]	StopDelay [msec]
Lock	200	200
Unlock	200	200
Height Down	150	100
Height Up	150	100
Tilt Left	150	100
Tilt Right	150	100
Trend	150	100
Reverse Trend	150	100
Back Down	150	100
Back Up	150	100
Legs Down	150	100
Legs Up	150	100
Kidney Down	150	100
Kidney Up	150	100
Slide Forward	150	100
Slide Rev	150	100

FIGURE 6-13. VALVE SETTINGS FORM

Sensor Tab

The sensor tab allows you to set the parameters for the following sensors (Figure 6-14):

- Tilt
- Trendelenburg
- Back
- Leg
- Slide

Sensors for kidney movements are mechanical devices that are adjusted physically.

CAUTION

CAUTION *—The Service Program will allow you to set sensor parameters outside the min and max range shown in TABLE 6-1. This could lead to damage to the table or its components, including*

a failure to operate. Always double check your settings before clicking on "Save Parameters".

Do this to set the parameters:

1. Click on the button between the icons for the function you wish to set.
   - The name of the function will appear in the top box in the listing
2. Use your cursor to highlight the number you wish to change.
3. Type in the new value to replace the old value.

Slide parameters are measured in millimeter movement from the center position.

The CPU responds to accelerometer voltages. For the five changeable parameters, the potentiometer voltage range is approximately -0.1 VDC to approximately 4.9 VDC. The minimum voltage is reported at the extreme minimum range and the maximum voltage is reported at the extreme maximum range. Based on this fact, the zero position (i.e., dead level) also has a positive voltage value. This value is approximately 2.5 VDC, but it will vary slightly from table to table and from parameter to parameter within a table. The CPU needs to know this zero value in order to perform the return-to-level movement when commanded. The zero value must be recorded for each table section.

NOTE — *Do not set the Zero Position by typing in a value. To be accurate, the Zero Position must be measured and set by the parameter's sensor, itself.*

Do this to set the zero position:

1. Level the section using the pendant controls and an accurate level.
2. Click on the "Set Zero Position" button on the Sensors Tab.

NOTE — *After saving the changes for a parameter to one CPU, change CPUs and save the same changes to the other CPU. Alternatively, you can use the "Copy to Other CPU" under the file menu.*

After setting all of values for the parameter to the desired levels, click on the "Save Values" button to record them in the table's CPU.

The Status (V) window on the tab shows the current value of the section in VDC. Thus, if the table is tilted slightly to the right (positive tilt) the voltage will read slightly higher than the zero position value. Similarly, if the table is tilted slightly to the left (negative tilt) the voltage will read slightly lower than the zero position value.

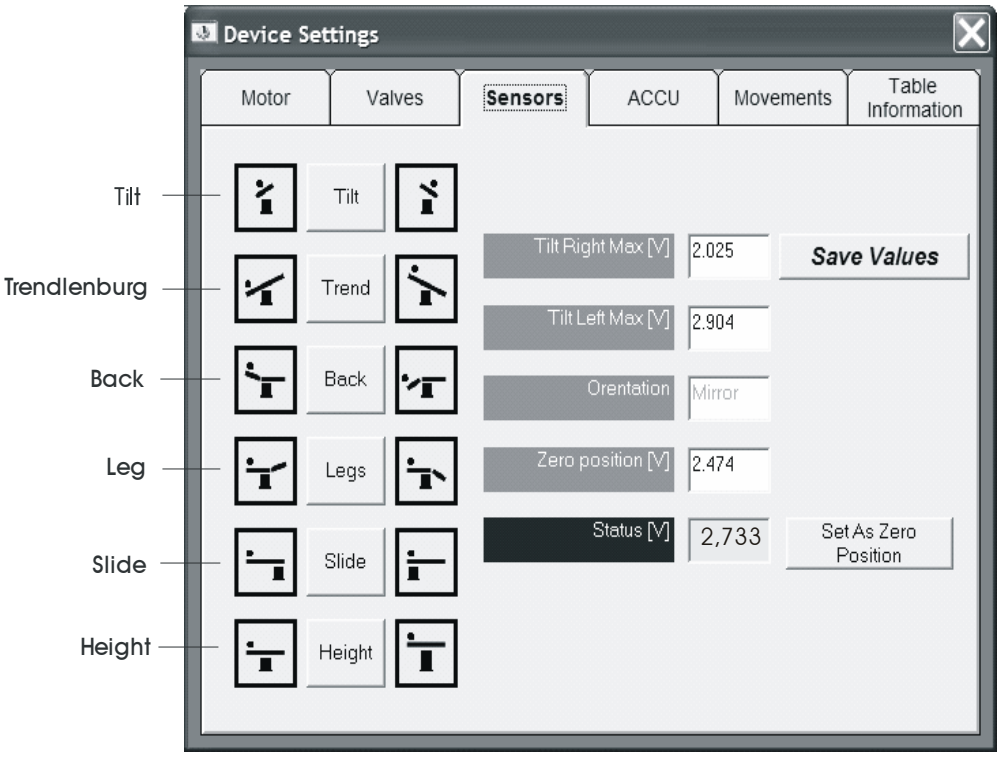


FIGURE 6-14. SENSOR SETTING FORM

TABLE 6-1. SENSOR PARAMETERS

Name	Max. Angle (Deg.)	Min. Angle (Deg.)
Tilt	20	-20
Trend	30	-30
Back	80	-45
Legs	2	-105
Slide	**118	**-90

NOTE

NOTE — All Sensor (Status) values must be between 0.100 and 4.900 V (at extreme positions). If they are outside of this range (calculated by angle and ratio) the table will not move.

ACCU Tab

The ACCU (accumulator) tab sets the battery power indicator display for the hand pendant (Figure 6-15 and TABLE 6-2). These are the voltage readings that cause the LED display to change from one level to the next higher level as the battery accumulates a charge. The voltages should be set toward the upper end of the range to ensure that the table has adequate time to charge before being unplugged from the AC mains.

CAUTION —*The Service Program will allow you to set ACCU parameters outside the ranges shown in TABLE 6-2. This could lead to false readings on the (physical and graphic) pendant LEDs, including a failure to operate. Always double check your settings before clicking on "Save Parameters".*

To set the value of the parameter, use your cursor to highlight the number you wish to change. Type in the new value to replace the old value.

The Status window on the tab shows the current battery charge level in VDC. A bar graph under the voltage value shows the charge as a percentage of total capacity. These are display values based on CPU readings; they cannot be changed in the field.

The shut down time slide sets the sleep time delay: how long after the last use until the hand pendant enters "sleep" mode. In sleep mode, the back lighting goes out and all LEDs turn off. The longer the table remains in "sleep" mode, the longer the battery charge will last.

User preference should be the primary consideration on how long the sleep time delay should be. Generally, procedures which require more frequent table position changes should have longer sleep time delays. Procedures that require infrequent position changes can have shorter sleep time delays.

To set the sleep time delay, click and hold the left mouse button as you drag the pointer to the desired setting. Time increments are in full minutes.

After setting all of the parameters to the desired levels, click on the "Save Values" button to record them in the table's CPU. (Remember to save the settings to both CPUs.)

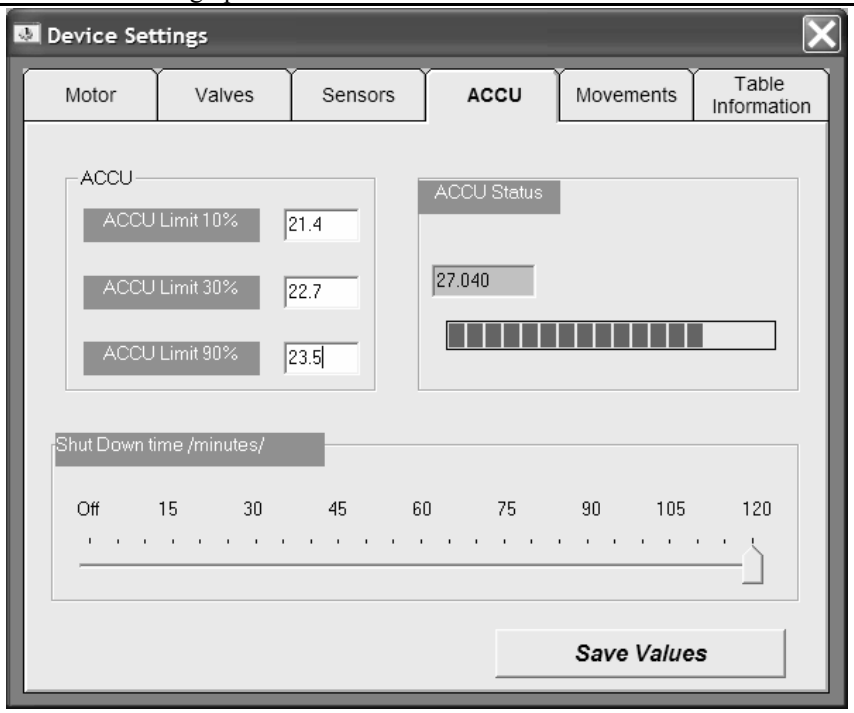


FIGURE 6-15. ACCU (BATTERY) DISPLAY SETTING FORM

TABLE 6-2. ACCU (BATTERY) SETTING PARAMETERS

Name	Default
Limit 10% (LED changes from Steady Red to Flashing Red)	21.4V
Limit 30% (LED changes from Flashing Red to Yellow)	22.7V
Limit 90% (LED changes from Yellow to Green)	23.5V
Sleep timer	120 minutes

Movements Tab

The Movements button lets you select how the table moves in response to the Return-To-Level, Flex, and Chair buttons on the hand pendant.

The amount of movement for each articulation is preset in four increments numbered from 0 to 3 (Figure 6-16).

0 = Continuous. When you press the hand pendant button for the function, the first section of the table will move so long as the button is held or until the section is at the limit for that articulation. The second action in the articulation begins automatically when the first action is completed. The action will continue so long as the button is held or until the action reaches its preset limit, etc.

1 = Holding the button moves the table sections in 5-degree increments. After the final section in the articulation has moved 5 degrees, the first section will move an additional 5 degrees, etc.

2 = Holding the button moves the table sections in 10-degree increments. After the final section in the articulation has moved 10 degrees, the first section will move an additional 10 degrees, etc.

3 = Holding the button moves the table sections in 20-degree increments. After the final section in the articulation has moved 20 degrees, the first section will move an additional 20 degrees, etc.

For example, if you have the Flex Motion parameters set to 1 and hold the Flex button:

- The back will lower 5 degrees (Trendelenburg) and stop.
- The seat will lower (reverse Trendelenburg) 5 degrees and stop.
- The legs will lower (reverse Trendelenburg) 5 degrees and stop.
- The back will lower an additional 5 degrees (Trendelenburg) and stop.
- The seat will lower an additional 5 degrees (reverse Trendelenburg) and stop.
- The leg section will lower 5 degrees (reverse Trendelenburg) and stop.
- Etc.

If you release the button before the articulation has reached its (5-, 10- or 20-degree) limit, then push and hold the button again, the motion will resume from where it left off and continue until it reaches the sequence limit.

Do this to set the movements parameters:

1. Click on the (▼) arrow to the right of the "Level" mode windows.
   - A drop down menu will appear
2. Click on one of the choices to select it.
   - The choice selected will appear in the window next to the (▼) arrow.
3. Click the down arrow (▼) to the right of the "Flex Mode" window.
   - A drop down menu will appear.
4. Click on one of the choices to select it.
   - The choice selected will appear in the window next to the (▼) arrow.
5. Click the down arrow (▼) to the right of the "Chair Mode" window.
   - A drop down menu will appear.
6. Click on one of the choices to select it.
   - The choice selected will appear in the window next to the (▼) arrow.
7. Click on the "Set" button to save your selections.

NOTE — *After saving the changes for a parameter to one CPU, change CPUs and save the same changes to the other CPU. Alternatively, you can use the "Save to Other CPU" under the file menu.*

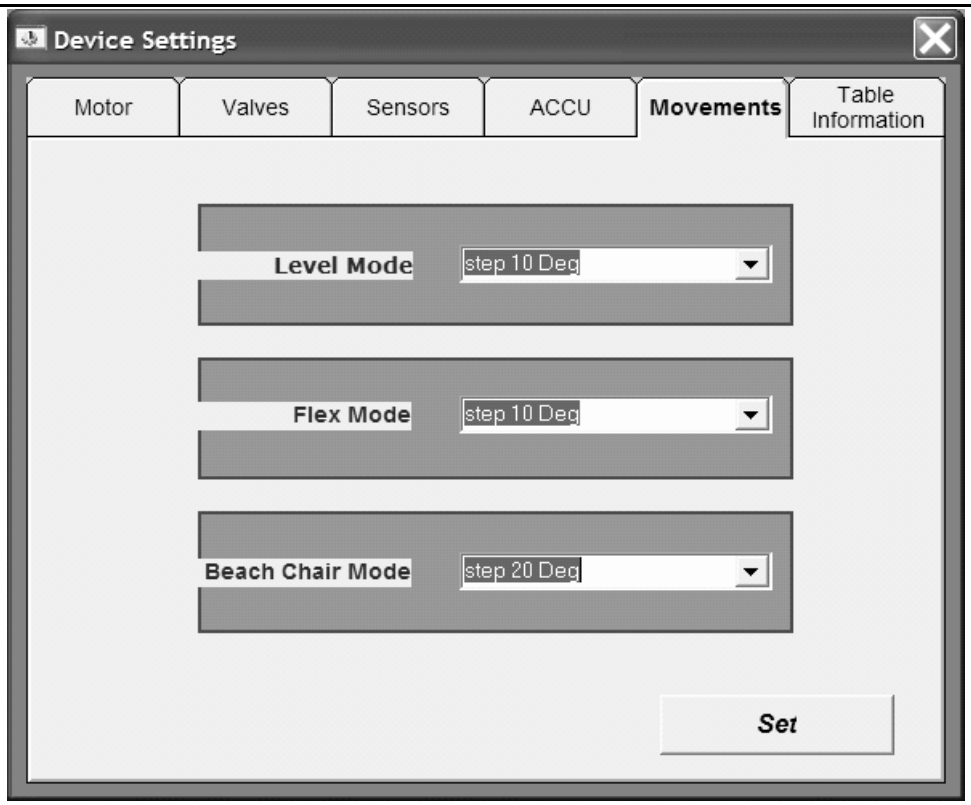


FIGURE 6-16. MOVEMENTS SETTING FORM

Table Info Tab

The information on this tab is display only. It cannot be changed by the technician in the field. The "Save" button on this form is not active.

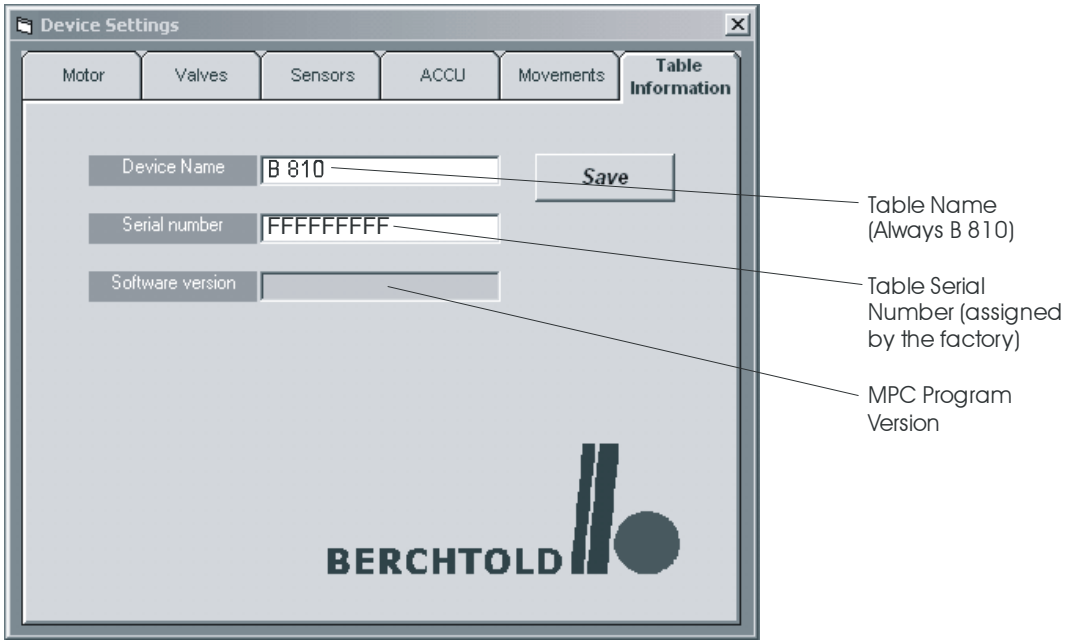


table info

System info Button

form

The system info button brings up a screen with six check boxes and a window where data are displayed (Figure 6-17). Four screen header buttons provide action controls:

Read Info Button

Once you check (✓) the box(es) next to the list item(s) you wish to review, click on the "Read Info" button to display the data in the information window.

Clear Errors Button

After you have reviewed the error codes stored in the table's CPU, click on this button to clear them from the table's memory. (The errors will, however, remain stored in the Service Program's database for the table.)

Print Button

When the information is displayed in the window, you can print a copy by clicking on the print button. The print preview screen in Figure 6-18 will appear to allow you to enter some basic information about the table you are testing. No print dialog box will display. The information will be automatically sent to whatever printer you have set up as your system printer.

Close Button

Once you have finished with the system information screens, click on the exit button to close the window.

The following text describes the items that can be reviewed:

- Keypad
  When you check (✓) the keypad box and click on the Read Info list, the state of the pendant's buttons will be displayed in the information window. The listing will show if a button is pressed or released in real time. Thus, you can use this function to test the pendant's performance.

- Sensors
  The Sensors selection has a number of subordinate selections that you can select from a fly out menu. To get the menu list, click on the word "Sensors". If you check the box (□) next to the word "Sensors" you will get a report on all sensors in the list below.

  □ Sensor Tilt
  □ Sensor Trend
  □ Sensor Back
  □ Sensor Legs
  □ Sensor Lock
  □ Sensor Kidney
  □ Sensor Slide
  □ ACCU Line
  □ AC Line
  □ Input 24V - Voltage
  □ Input Current [A]
  □ Input 12V
  □ Input 5V
  □ GND – 0V

  Check (✓) the box(es) next to the sensor(s) you want to read, then click on the "Read Info Button." The current reading from each of the sensors you selected will be displayed in the information window. The "Results" column in the information window displays the number of errors logged.

- Foot Control
  The Foot Control selection has a number of subordinate selections that you can select from a fly out menu. To get the menu list, click on the words "Foot Control". If you check the box (□) next to the word "Foot Control" you will get a report on all sensors in the list below.

  □ Height Down
  □ Height Up
  □ Tilt Left
  □ Tilt Right
  □ Trend
  □ Trend Reverse

  Check (✓) the box(es) next to the parameter(s) you want to read, then click on the "Read Info Button." The current reading from each of the parameters you selected will be displayed in the information window.

- Leds State
  When you check (✓) the leds state box on the Read Info list, the state of each of the LEDs will be displayed in the information window.

- Errors
  When you check (✓) the Errors box on the Read Info list, the last 100 error codes recorded by the CPU will be displayed. Errors are displayed on a First In/First Out (FIFO) basis. If more than 100 errors are logged, each new error after the one-hundredth will result in the elimination of the oldest error in the register. After you have dealt with all of the codes, you can press the Clear Error button on the top bar of the System Info window to clear the codes. Clearing the codes only clears them from the table's CPU memory. The error codes remain in the Service Program's database as a part of the table's history.

- Hours Total
  When you check (✓) the hours box on the Read Info list, the total number of working hours is displayed in the information screen. The number of working hours is the number of hours that the main power switch at the base of the table has been in the ON position. The number of working hours cannot be deleted or changed by the service technician.

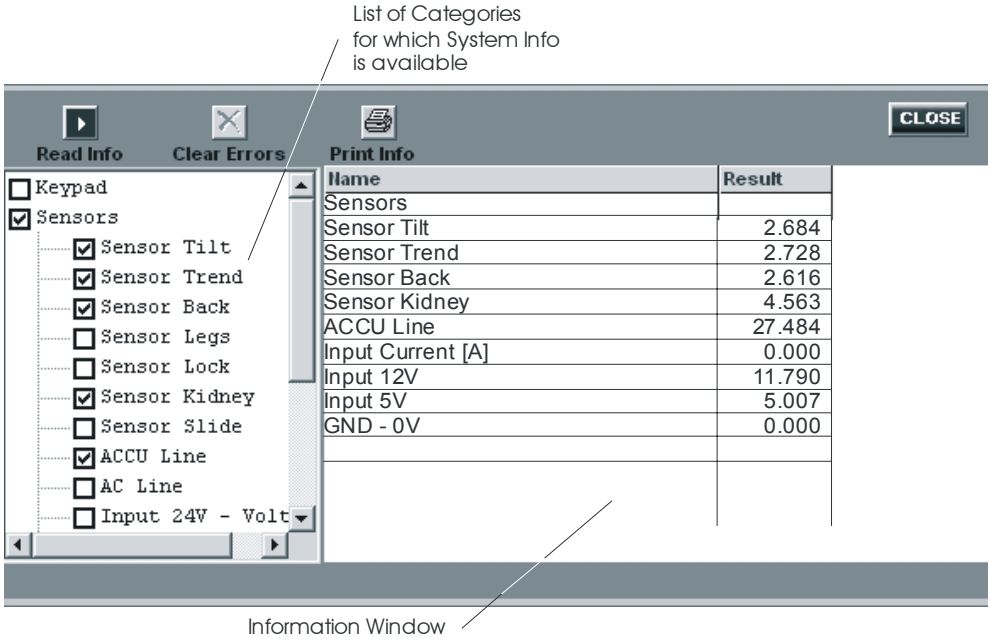


FIGURE 6-17. SYSTEM INFO DISPLAY

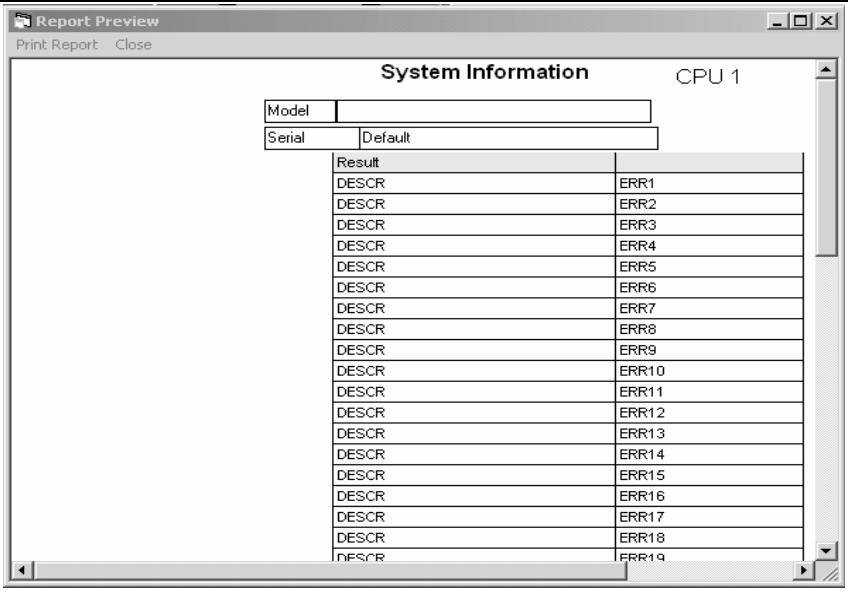


FIGURE 6-18. PRINT PREVIEW AND PRINTED REPORT FORMAT

Cycle Test Button

The cycle test button is inoperative in the customer and field service versions of the service program.

The cycle test button brings up a loop test form where you can program a series of articulation movement tests (Figure 6-19).

These tests could be performed to confirm the validity of any repairs. They can also be used to demonstrate different table functions during display or orientation sessions.

The form has a display screen to provide test progress information, such as the name of the current movement, the number of loops remaining in the test sequence, and the whether the testing is in play, pause, or stop mode.

A series of Play, Pause, and Stop buttons under the display window control the tests procedure:

- Play Button
  The play button starts the tests beginning with the first test on the list in the program area. The play button always starts the sequence from the beginning of the first test movement in a programmed listing. Thus, if the sequence was paused at the fourth test movement in a series and you select play to restart the test, the tests will start again with the first movement programmed, not the fourth or fifth.
- Pause Button
  The pause button stops the test temporarily. This can allow you, for example, to change the commands (i.e., the number or sequence of tests, the number of cycles, etc.). To resume testing, press the pause button again. The test will not start with the test that was in process when you pressed the pause button. Instead, the tests will start at the beginning of the cycle for the next line in the test listing.
  If you used the pause button to stop a test in process, you should add the same test as the next item in a sequence in order to complete the testing of the movement.
- Stop Button
  The stop button stops the execution of the tests.

The window below the Play/Pause/Stop buttons is the program area. By placing your cursor over one of the lines under the Movement column and right clicking, you will get a flyout menu that offers you a choice of actions to test. Several of these choices have additional options that will flyout when your cursor passes over them:

- Kidney ‣ Down — Up
- Slide ‣ Forward — Reverse
- Height ‣ Down — Up
- Tilt ‣ Left — Right
- Trend ‣ Trend — Reverse
- Back ‣ Down — Up
- Legs ‣ Down — Up

When you click on the flyout menu choice, it will be entered on the line your cursor is over.

If you have a blank line between two selections, you can remove it by clicking on the Delete Row option on the flyout menu. You can also remove a selection with the Delete Row option should you change your mind. If you delete a row, all items listed below it will automatically move up one line.

If you wish to add a test line between two you have already selected, place your cursor over the upper selection and click on the Insert Row option on the fly out menu. A blank row will be added below the upper selection so you can select another motion from the flyout menu.

To replace an item that you have already selected, place your cursor over the item and right click. Select a new movement from the flyout menu, and it will replace the original selection in the listing.

Use the Pause option on the flyout menu to set pauses in the program. It is good practice to set a pause after every movement; this will help to keep the hydraulic motor from overheating.

The Time column on the right of the program area allows you to set how long the table will perform the function. The time increments are in full seconds. Note that you can set the time for a shorter or longer period than required for the table to perform a movement through its full range. You should experiment with the time settings to ensure that you program enough time for the motion, but no so much that the hydraulic motor runs overly long.

Four buttons to the right of the program area provide additional controls:

- Clear Button
  The clear button clears all the selections in the program area.
- Close Button
  The close button stops the test and closes the Loop Test form.

NOTE

NOTE — *The Load File and Save File commands read and write files from and to the computer that the Service Program is operating from. Because of this, your load and save options include your floppy, CD, and other media drives.*

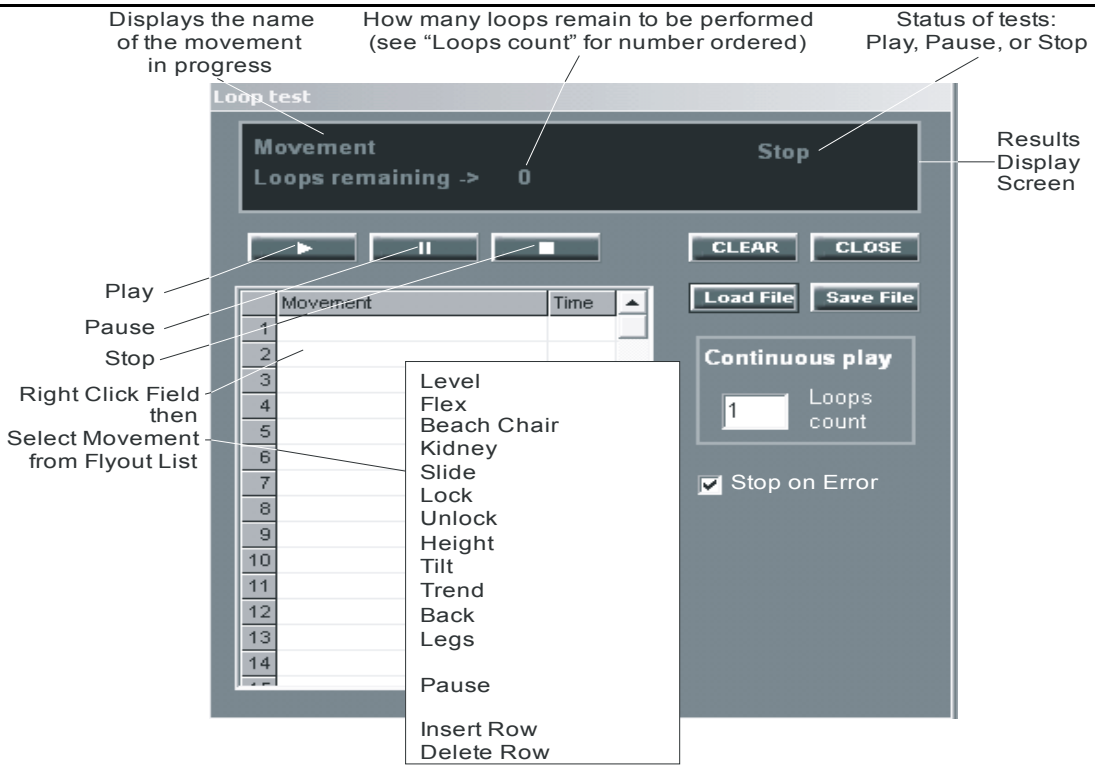


FIGURE 6-19. CYCLE TEST FORM

- Load File Button
  The load file button opens files with saved tests and loads them in the list of the commands. This can be a faster way of loading the tests you perform than going through the menu selections. When you click on this button, a standard Windows open file prompt will appear to let you choose a file directory and file name.
- Save File Button
  The Save file button saves the test list from the program area into a file. When you click on this button, a standard Windows save prompt will open to let you choose a file directory and enter a unique file name.

The Continuous play box on the right of the form allows you to program the tester to perform a series of tests in a continuous series of loops. This function is useful for demonstrating the table's functions and capabilities.

Enter a number in the box. Once you click on the start button, the Service Program will automatically run each of the motion tests in turn from the first to the last. Once the last test has run, the program will return to the first and go through the sequence again. This loop processing will continue for the number of cycles you specified.

If you wish the testing to stop if it encounters an error, check the "Stop on Error" box on the right of the form. If you do not check the "Stop on Error" box, the error will be logged in the CPU, and the test will continue to run. You can review the errors encountered during the loop test under the System Info form described earlier.

CPU ERROR CODES

The CPU is programmed to store error codes for a series of specific errors. These are numbered from 1 to 64. TABLE 6-3 shows a listing of these codes and their causes. The error code table also includes potential solutions to eliminate many of the errors.

For errors where no solutions are suggested, you can use the error name and description to determine additional diagnostic steps that can be used to discover the problem and return the table to service. A Troubleshooting Guide (TABLE 6-4) follows the Error Code listing.

TABLE 6-3. OPERON B 810 ERROR CODES

No.[1]	Error	Reaction	Description	Solution
1	Program Memory checksum error	Halt	Defect in the internal Program Memory (Flash)	• Return the CPU to the factory for reprogramming. • Replace the CPU.
2	RAM memory fault	Reset	Defect in the internal Data Memory (RAM)	• Replace the CPU.
3	EEPROM fault	Continue	Defect in the internal non-volatile Data Memory (EEPROM), checksum is incorrect	• Return the CPU to the factory for reprogramming. • Replace the CPU.
4	System Clock fault	Reset	Synchronization error between system clocks. NOTE: This "error" may be reported at start-up while clocks are working to synchronize.	• Non-critical error. • Run table through all functions to ensure proper operation. If functions fail to operate as expected, replace the CPU.
6	Internal error 1	Reset	Error in the Micro controller, possibly Hardware or Software	Replace the CPU.
7	Internal error 2	Reset	Error in the Micro controller, possibly Hardware or Software	Replace the CPU.
8	Internal error 3	Reset	Error in the Micro controller, possibly Hardware or Software	Replace the CPU.
9	Internal error 4	Reset	Error in the Micro controller, possibly Hardware or Software	Replace the CPU.
10	Internal error 5	Reset	Error in the Micro controller, possibly Hardware or Software	Replace the CPU.
14	ACCU fault	Continue	Battery is disconnected or defective	• Reconnect battery. • Replace battery
16	Motor "voltage feedback" fault	Continue	Voltage is less than the voltage expected by the Motor (expected minimum is 12V)	• Check battery and the charging circuit connections. • Refer to Figure 5-2 and check circuits to and form J2 on the CPU board. Replace faulty harnesses or components.

No.[1]	Error	Reaction	Description	Solution
17	Motor "current feedback" fault	Continue	Amperage exceeds expected current draw from Motor (Expected maximum is 14.3 amps) Motor short circuit, Motor disconnected, broken wiring	• Locate and eliminate short circuit. • Connect motor. • Replace broken wire(s).
19	12 V fault	Continue	Power Supply 12 volt fault Voltage Regulator possibly damaged	• Check battery and the charging circuit connections. • Refer to Figure 5-2 and check circuits to and form J2 on the CPU board. Replace faulty harnesses or components.
20	5 V fault	Continue	Power Supply 5 volt fault, Voltage Regulator possibly damaged	Refer to Figure 5-2 and check the sensor circuits. Replace defective harnesses or components.
21	Ground or ADC fault	Continue	Ground wiring possibly broken, ADC of the Micro controller defective	• Check ground wiring continuity. • Replace CPU.
22	Sensor-1 Fault (Tilt)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
23	Sensor-2 Fault (Trend)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
24	Sensor-3 Fault (Back)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
25	Sensor-4 Fault (Legs)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
26	Sensor-5 Fault (Lock)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.

No.[1]	Error	Reaction	Description	Solution
27	Sensor-6 Fault (Kidney)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
28	Sensor-7 Fault (Slide)	Continue	Sensor disconnected, wiring broken, short circuit	• Connect sensor. • Identify and replace broken wiring. • Locate and remove cause of short circuit.
37	Valve-1 fault (LOCK)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
38	Valve-2 fault (UNLOCK)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
39	Valve-3 fault (HEIGHT DOWN)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
40	Valve-4 fault (HIGHT UP)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
41	Valve-5 fault (TILT LEFT)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
42	Valve-6 fault (TILT RIGHT)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.

No.[1]	Error	Reaction	Description	Solution
43	Valve-7 fault (TREND)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
44	Valve-8 fault (TREND REVERSE)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
45	Valve-9 fault (BACK DOWN)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
46	Valve-10 fault (BACK UP)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
47	Valve-11 fault (LEGS DOWN)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
48	Valve-12 fault (LEGS UP)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
49	Valve-13 fault (KIDNEY DOWN)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.

No.[1]	Error	Reaction	Description	Solution
50	Valve-14 fault (KIDNEY UP)	Continue	Valve disconnected, wiring broken, short circuit, damaged solenoid coil	• Connect valve. • Identify and replace broken wiring. • Locate and remove cause of short circuit. • Replace the Solenoid coil.
53	Hand Pendant fault	Continue	Push button defective during initial test, wiring broken NOTE: This error code will be recorded if the operator presses two or more buttons when switching the pendant on from "sleep" mode.	• Check connection • Check all pendant functions. Replace pendant if functions to not operate as expected.
55	Foot Control Panel fault	Continue	Pedal pressed or defect during initial test NOTE: This error code will be recorded if the operator presses two or more buttons when switching the foot control on from "sleep" mode.	• Check connection • Check all footswitch functions. Replace footswitch if functions do not operate as expected.
58	Event: Communication command "Reset"	Reset	Micro controller was reset by communication command "Reset"	No action required.
59	Reset Instruction Executed	Reset	Micro controller was reset by software instruction	No action required.
60	Watchdog timeout reset	Reset	Oscillator / Crystal 10 MHz defective, incorrect frequency	• Non-critical error. • Run table through all functions to ensure proper operation. If functions fail to operate as expected, replace the CPU.
61	Brown-out reset	Reset	Supply voltage for the Micro controller (nominal +5V) is between 4.2 volt and 4.6 volt. Battery almost discharged, Voltage Regulator defective	• Charge battery • Replace charging circuit
62	Stack overflow/underflow	Reset	Runtime error in the software caused by inadequate program memory	Replace the CPU
63	Unknown RESET condition	Reset	Micro controller was reset through unknown cause NOTE: This error can be caused by electromagnetic radiation strong enough to penetrate the table's shielding.	No action required. If problem persists check for EMI source
64	Event: Power Up (First time ON)	Continue	This is not an error. It is a counter that records the "Power Up" events.	No action required.

1 Missing numbers in the sequence indicate error codes reserved for future releases. If you receive an unnumbered error code, contact Berchtold Technical Service for assistance.

TROUBLESHOOTING

NOTE

***NOTE** – It is assumed that personnel performing maintenance on the OPERON B 810 table have successfully completed a factory training program, and have a thorough understanding of electronics, hydraulics, and mechanics. Service personnel should also have the PC based service program and RS-232 cable for connection to the table. A good tool kit, including a set of metric Allen wrenches, metric open end wrenches, and a metric ratchet set is recommended.*

1. The best method to use in troubleshooting a problem is to gather as much information as possible about the problem.
   - Try to get someone familiar with the problem to describe it for you.
   - If possible, duplicate the actions that led to the problem and try to get the same results.
2. Use the information in this manual, your knowledge of electronics, hydraulics, and mechanics, and come up with a test plan to pinpoint the problem.
3. Not all of the scenarios that can occur can be included in this manual. Some of the more common problems that can be identified without using the Service program or removing exterior covers or components are listed in TABLE 6-4. Figure 6-20 shows the location of many components listed in the table. The Service program diagnostics described under Service Program Operations and summarized in TABLE 6-4 should help you narrow your focus.
4. If a problem occurs that cannot be placed in one of these categories, contact Berchtold Technical Service at 800-243-5135 for assistance.

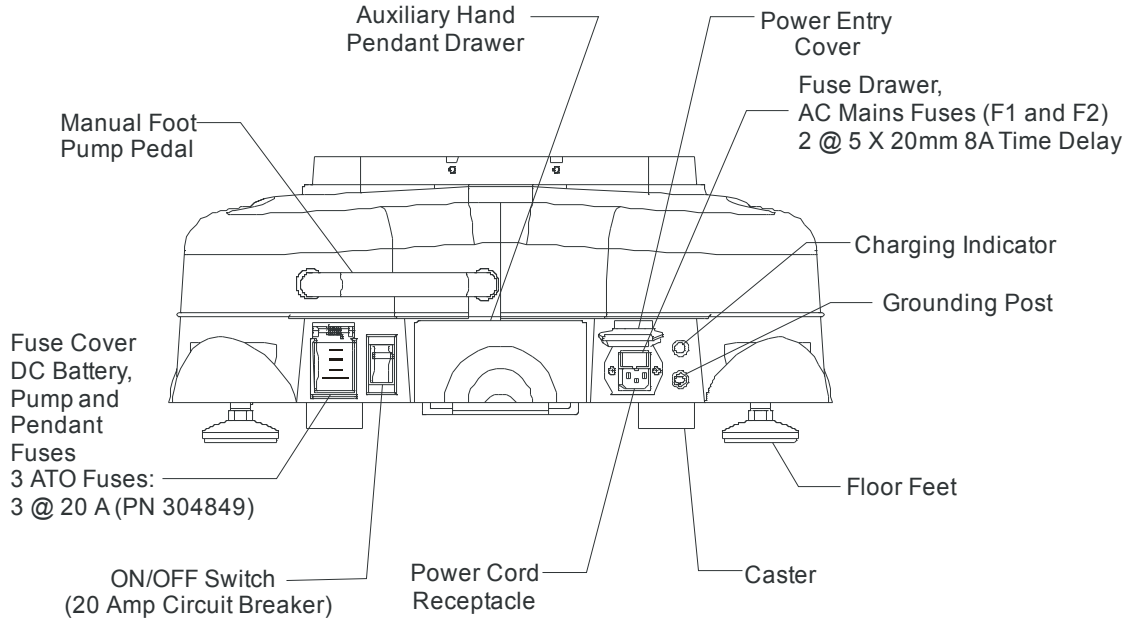

Auxiliary Hand Pendant Drawer
Power Entry Cover
Fuse Drawer, AC Mains Fuses (F1 and F2) 2 @ 5 X 20mm 8A Time Delay
Manual Foot Pump Pedal
Charging Indicator
Grounding Post
Fuse Cover DC Battery, Pump and Pendant Fuses 3 ATO Fuses: 3 @ 20 A (PN 304849)
Floor Feet
ON/OFF Switch (20 Amp Circuit Breaker)
Power Cord Receptacle
Caster

FIGURE 6-20. COMPONENT LOCATIONS

TABLE 6-4. TROUBLESHOOTING GUIDE

Problem	Action
Loss of main AC electrical power, indicated by the charging indicator being OFF.	If battery indicator is green or yellow, no action is required. The batteries are charged.
	If the battery indicator is red (flashing), use the manual foot pump to provide hydraulic power.
	If the battery indicator is red (steady), use the auxiliary pendant to select functions and the manual foot pump to provide hydraulic power.
Main AC power is present, but the charge indictor does not illuminate.	Check mains AC fuses (see Figure 6-20). Replace if blown. If this does not correct the problem, an internal table failure has occurred that requires repair. Contact Berchtold Service for assistance.
Primary hand pendant will not turn on.	The main DC power switch on the base must be in the ON position (up). If it is down (OFF), push on the top of the switch to turn it to the ON position (see Figure 6-20).
	The Battery fuse is blown. • Check the 2nd from the top fuse in the drawer (Figure 6-20). • Replace if blown. • Take a current reading to check for an over current condition. • Isolate and replace failed parts. • Plug table into AC power supply for use if no fuse is available.
Primary hand pendant illuminates when turned on, but will not function.	Check the status of the Lock LED. The table must be locked to the floor to enable the other functions to operate. If the table is unlocked, press LOCK to lock the table to the floor.
	Check the battery status LED. If it shows a steady red light, the CPU has commanded an automatic shut down and disabled the hand pendant. If possible, connect the power cord to an AC power source. If no AC power source is available, use the auxiliary pendant (and foot pump, if necessary) to complete the procedure.
Primary hand pendant failure.	Check all pendant connections. If all are satisfactory, replace pendant. Use the auxiliary hand pendant (and the foot pump if necessary) to complete the procedure. Use the service program to check the function
Head section or leg extension cannot be removed.	Ensure that the levers on each end of the head or leg section are fully depressed. Pull the head section or leg extension out by applying an even force on each side of the section.
Service indicator illuminates.	An illuminated service indictor can cause certain functions, such as RTL, CHAIR, AND FLEX to be disabled. Other functions may work normally. Use the Service Program to determine the cause, then repair or replace the component at fault.
The primary hand pendant functions normally, but the pump motor will not operate.	The motor may be overheated. Let the table sit for 15 minutes before attempting another function. The auxiliary pendant and foot pump can be used to complete the procedure.
	Check fuse F4 in the left power center (Figure 6-20). Replace if blown. Check for over current on pump. Replace pump if defective.
	The pump or the CPU may have failed. If pump is good, replace CPU.

Problem	Action
The pump motor functions, but no sections move when activated.	Check the primary pendant's fuse (F5), in the left power center (Figure 6-20). Replace if blown. Use the Service Program to check for over current conditions at solenoids. Repair wiring or replace coil, as indicated by Service Program.
	If wiring and solenoids are satisfactory, replace CPU..
The auxiliary hand pendant will not function	Check wiring for shorts.
	The auxiliary drawer switch or the pendant may have failed. Replace drawer switch.

BATTERIES AND CHARGE INDICATORS

Introduction

A table should be charged overnight or for at least 8 hours before use under the following conditions:

- When it is first delivered and set up.
- After being returned to service after storage.
- After the batteries have been replaced.
- When the battery capacity indicator on the hand pendant shows yellow or (flashing or steady) red.

The batteries should be charged every weekend for at least 8 hours under normal use conditions. Normal use conditions consist of five 8-hour shifts.

Batteries should be replaced after 3 years use or when the charge/discharge cycles drops below once in every five 8-hour shifts.

The battery status LEDs on the pendant show the capacity of the batteries (Figure 6-21). The presence of AC will change the display levels (TABLE 6-6).

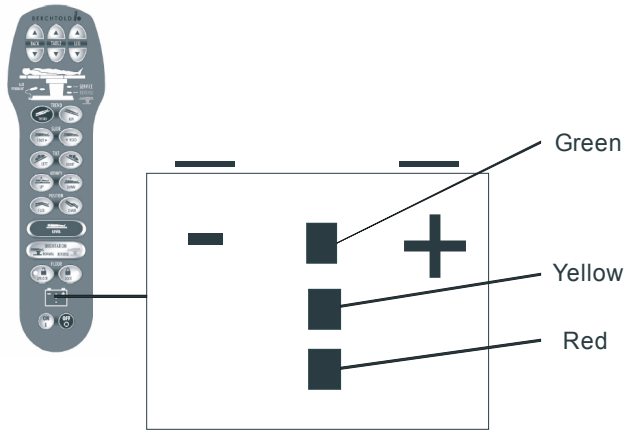


FIGURE 6-21. BATTERY LED INDICATORS

No AC Detected

If AC is not connected when the table is turned on, the display on the hand pendant will show the battery's charged status (Figure 6-21). Refer to TABLE 6-1 to determine the components that will function at each battery power level.

TABLE 6-5. LED AND TABLE STATUS FOR NO AC POWER DETECTED

LED Color	Voltage Range	Main Pendant	Pump Motor	Auxiliary Pendant
Green	Above 90%	Functional	Functional	Functional
Yellow	Below 90% but Above 30%	Functional	Functional	Functional
Red, Steady	Below 30% but Above 10%	Functional	Non-Functional	Functional
Red, Flashing	Below 10%	Non-Functional	Non-Functional	Functional
CPU and Pendant Power Down	Below 10% for more than 1 second.	Non-Functional	Non-Functional	Functional

The pendant's battery status LED display and the disabling of the motor or solenoid activation will not change while the motor or the solenoids are active. The CPU will wait one second after the function has stopped to sense and act on the battery voltage.

The green and yellow ranges of the LED display will allow the table to function normally for 1 week under the conditions specified in the table's Product Specification.

The green range indicates that the battery's charge is between 90 and 100% of capacity.

The yellow range indicates that the battery's charge is between 54 and 90% of capacity. When the yellow LED illuminates, the batteries should be charged. A battery with a yellow display will operate a table for 1 week under normal conditions.

The steady red range will allow the table to be used via the main pendant to activate the solenoids, but the main hydraulic pump will be disabled. The manual foot pump must be used to provide hydraulic pressure in this case. Once the state changes to flashing or steady red, AC power must be detected to change the LED display. Connecting the table to an AC power supply will provide the power to operate all table functions while recharging the batteries.

From the time that the battery status switches into the flashing red state, and possibly through the steady red state, the batteries will have enough capacity to run the table for at least one day under normal usage conditions as defined in the Operon B 810 product specification. The latter part of the operation may need to be completed via the auxiliary pendant and foot pump if the status moves into the steady red state.

The low battery charge automatic shutoff feature only affects the primary hand pendant and only occurs during the steady red state. The low battery auto-shutoff feature will not affect the operation of the auxiliary pendant. If the battery voltage is below 10% for more than 1 second, the auto-shutoff feature will turn off the primary hand pendant. If the hand pendant ON button is pressed after a low battery auto-shutdown and AC power is present, the table will power up and all functions will operate normally.

AC Detected

If AC power is detected, the LED display only serves to indicate the battery status as the batteries are charging. No functions will be disabled due to battery problems, because the power supply will provide current to both the batteries for charging, the table's electronics, and the hydraulic pump motor.

If battery voltage is not sensed due to a dead battery, blown battery fuse, or an open sensor line, the steady red LED will display and the service LED will light. An error code also will be logged. All table functions will operate normally while connected to AC via the power supply.

The transition voltage for each LED is higher when charging. This will assure that the operator does not expect the table to be fully charged if charging is discontinued at the transition point from a lower to a higher LED level. See TABLE 6-6 for AC detected function information.

TABLE 6-6. LED AND TABLE STATUS FOR AC POWER DETECTED

LED Color	Voltage Range	Main Pendant	Pump Motor	Auxiliary Pendant
Green	Above 90%	Functional	Functional	Functional
Yellow	Below 90% Above 30%	Functional	Functional	Functional
Red, Steady	Below 30% Above 10%	Functional	Functional	Functional
Red, Flashing If No battery is Detected	Below 10%	Functional	Functional	Functional

ELECTRICAL PARAMETERS

Supply Voltage

The supply voltage is nominally 24 volts. This nominal value can vary, depending on the battery voltage (if on battery power), or on the charging voltage (if connected to AC). When taking readings on a functional table, the voltage can range from 0VDC to 28 VDC.

0 provides information on some electrical parameters for the table.Electrical Parameters

Parameter	Value
Main DC Voltage	0V – 28V DC
CPU Current Draw	Max 325ma
Current draw in “OFF” mode	<8.0mA
Hydraulic Motor Current Draw	0-15 Amps DC
Solenoid Current Draw	0.35 - 0.42 Amps DC
Power Supply/Charger	450W switcher, variable output, 24-32Volts
Leakage current at 120VAC	< 50 microamps.
Main Batteries	12V, 28Amp hour sealed Lead Acid

PERIODIC MAINTENANCE

Regularly scheduled preventive maintenance and inspection is essential for continued reliable operation. TABLE 7-1 lists the minimum requirements to maintain the table in a ready condition.

TABLE 7-1. RECOMMENDED MAINTENANCE SCHEDULE

Maintenance Item	Maintenance Period
Inspection:	
Electrical safety (visual)	Monthly
Remove base cover to check for contamination around foot pump shaft. Clean as required	Quarterly
Hydraulic system operation	6 monthly
Ground continuity/leakage current	6 monthly
Flexible hydraulic lines	Annually
Hydraulic fluid level	Annually or whenever leakage is suspected or hydraulic components have been replaced.
Fasteners and retaining clips	Annually
Clamps and accessories	Annually
Structural integrity of the table	Annually
Slide motor	Annually
Drive belt condition and tension	Annually
Replacement:	
Batteries	Every 3 years or when charge/discharge cycle drops below five – eight hour shifts.

ELECTRICAL INSPECTION

Inspect the power cord for insulation cracks and cuts. Replace the power cord if damage is found.

Inspect the integrity of the connectors.

Inspect the power centers for damage (see Figure 6-20). Replace broken parts.

Internal electrical inspection is not required unless the covers have been removed for corrective maintenance. In this case, all electrical connections should be checked for tightness prior to installing the covers.

HYDRAULIC SYSTEM OPERATION

***NOTE** – In order to test the foot pump, you must use the auxiliary pendant to select the function to be tested.*

All functions, including the foot pump, may not be used on a day-to-day basis. Therefore, all hydraulic functions should be verified as being operational with the main pendant, the auxiliary pendant, and the foot pump.

GROUND CONTINUITY/LEAKAGE CURRENT

This is a test of the AC safety of the system. This should be checked with a safety analyzer, such as a Bio-Tek 170. This is normally a periodic facility requirement and should be tested in accordance with their test plans.

FLEXIBLE HYDRAULIC LINES

This requires the removal of the base covers, the side shields, and the column covers (remove lower fasteners, and slide the shields up).

The hydraulic lines should be inspected for wear and for tightness at connection points.

The areas around the hydraulic lines should be inspected for signs of oil, indicating a leak that needs repair.

HYDRAULIC FLUID LEVEL

The hydraulic fluid level should not change unless there is a leak.

The table should be positioned properly to check the level. The proper position is:

- Top bellows screws removed (3 on each side).
- Table fully elevated and locked
- Back and leg level
- Trendelenburg level
- Tilt Level

The fluid should be to the mark on the column. This mark is 75mm (3") from the bottom of the reservoir (Figure 7-1).

NOTE

NOTE – *Do not overfill the hydraulic fluid reservoir. Doing so can cause the fluid to leak out of the breather cap.*

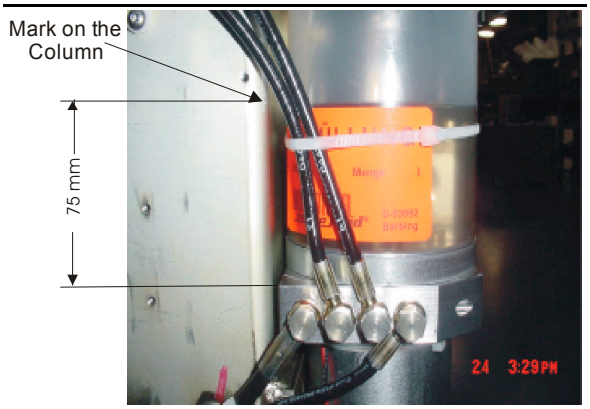


FIGURE 7-1. HYDRAULIC OIL FILL LEVEL

FASTENERS AND RETAINING CLIPS

The external fasteners for the base cover, the column shields, the side shields, and the tabletop surfaces should be checked for tightness.

CLAMPS AND ACCESSORIES

If accessories are used with this table, they should be inspected for mechanical integrity and proper fit.

STRUCTURAL INTEGRITY OF THE TABLE

This involves inspection of the integrity of the lift tubes, the column weldments, the base casting, and the side frames.

CLEANING AND DISINFECTION

WARNING

WARNING *— Unplug the power cord before cleaning the table if cleaning liquids will be used near the power cord receptacle. Under no circumstances should steam or extremely hot water (over 150°F/66°C) be used to disinfect or clean the table. Elevated temperatures and high humidity will weaken the hydraulic lines and result in failure of the hydraulic system and increased leakage currents. Do not clean this table in automatic cart washing equipment. Use of high-pressure water guns could lead to an electrical malfunction and must be avoided.*

NOTE

NOTE *— The use of quaternary-type disinfectants without immediate rinsing may result, after an extended period of time, in corrosion of painted and plated table components. Rinse all surfaces that come in contact with this type of disinfectant and wipe dry.*

NOTE

NOTE *— The Operon B 810, with all covers installed, is splash proof in accordance with the IPX4 standard defined in IEC 529. Flooding, fogging, or steam cleaning is not recommended.*

STAINLESS STEEL SURFACES

Exterior surfaces should be regularly wiped clean with a mild detergent solution, rinsed with a cloth saturated in clean water, and wiped dry with a soft lint-free cloth.

CLEANING METHODS

When cleaning stainless steel, never wipe the material in a circular motion. Always make the cleaning strokes in the same straight direction as the grain of the metal.

Clean the surfaces in the following manner:

Apply an appropriate cleaning agent using a saturated soft lint-free cloth.

- Rinse the surfaces with clear water using a soft lint-free cloth.
- Dry the surface with a soft lint-free cloth.

CAUTION

CAUTION *— Failure to thoroughly dry the surface after cleaning may result in rust.*

CLEANING AGENTS

The best cleaning agent is mild detergent. If stubborn stains persist, they should be removed using a mild non-chlorinated, nonabrasive cleanser.

Strong bleaches and disinfectants that are left on the stainless steel may corrode or pit the surface of the metal.

The surface should always be rinsed with clear water and then dried, using a soft lint-free cloth, to remove any residual cleaning agent.

REMOVING STAINS

Special cleaning is required to remove stubborn stains such as plaster or blood that was left on the surfaces for a long period of time. A 5% acetic acid solution or white vinegar is a good stain remover.

APPLYING DISINFECTANTS

To disinfect exterior surfaces, use a quaternary ammonium or similar type disinfectant compound according to the manufacturer's direction for use. Rinse and wipe dry with a soft lint-free cloth.

***NOTE** — DO NOT use iodophors; staining will result.*

PAINTED SURFACES

Painted surfaces should be wiped weekly with a damp, clean, soft cloth and frequently washed with a mild soap and water solution to remove persistent stains. Application of paste wax will reduce staining and help preserve the surface luster. Harsh cleansing powders should not be used on painted surfaces.

CONDUCTIVE ITEMS

Conductive cushions, pads, belts, and other components can be kept clean by washing them with mild soapsuds immediately after staining. If stains are persistent, a soft-bristle brush with mild soapsuds or detergents will usually remove the stain. It is important that stains be removed as soon as possible.

Pads may be cleaned with either phenolic or quaternary type disinfectants in concentrations recommended by the manufacturer. Disinfectants applied at full concentration or in highly concentrated solutions will decrease the life of the pad. Iodophor type disinfectants may result in staining.

***NOTE** — The cushions and other accessories must be clean in order to maintain conductivity.*

***NOTE** — Do not put pads on tabletop when it is wet. Allow table top and pad to dry prior to installing pads and cushions.*

HAND PENDANTS

The primary hand pendant and auxiliary hand pendant may be cleaned with mild detergent solutions, sanitizers, and disinfectants.

***NOTE** — Do not use solvents on plastic surfaces. Most solvents will leave permanent blemishes on plastic parts.*

***NOTE** — Do not submerge the pendants in fluids for cleaning; use only a damp cloth to clean the pendants.*

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PARTS INTRODUCTION

The drawings for repair parts for the **OPERON B 810** table may be obtained by calling BERCHTOLD (800) 243-5135 Engineering Dept. Due to various complex procedures required to ensure the integrity of some assemblies, not all repair parts are available at the level that may be illustrated in the drawings. If there are any questions, contact BERCHTOLD Corp. at the phone numbers on the back of this manual.

The following repairs must be done at the next higher level of assembly:

1. CPU/Extension/Auxiliary/Connector boards – Replaced as units; no board component replacements available.
2. Power Supply - Replaced as a unit; no component replacement.
3. Main and Auxiliary hand Controls - Replaced as units; no discrete replacement parts.
4. Footswitch – Replaced as a unit; no discrete replacement parts.
5. Hydraulic manifolds - Replaced as units; no discrete replacement parts.
6. Main Support Column – Main Lift Cylinders or structures are not field serviceable.

FASTENER TORQUE REQUIREMENTS

The parts drawings in this section identify fasteners by size and type. Some bills-of-material call for the use of thread lock compound for some fasteners.

Unless otherwise specified, all fasteners should be torqued to the values specified (± 10%) in Table 8-1. Where a thread lock compound is specified, it is used in addition to the torque application.

CAUTION *— Hollow plugs used in the hydraulic system have different torque values than the mechanical fasteners. See Table 4-3 for hollow plug torque requirements.*

TABLE 8-1 GENERAL FASTENER TORQUE SPECIFICATIONS

Fastener Size	Torque Setting	
	Ft Lb	N•M
M3	1.0	1.4
M4	2.1	2.9
M5	4.1	5.5
M6	7.4	10
M8	17.0	23
M10	36.7	47
M12	59.0	80
M14	95.9	130

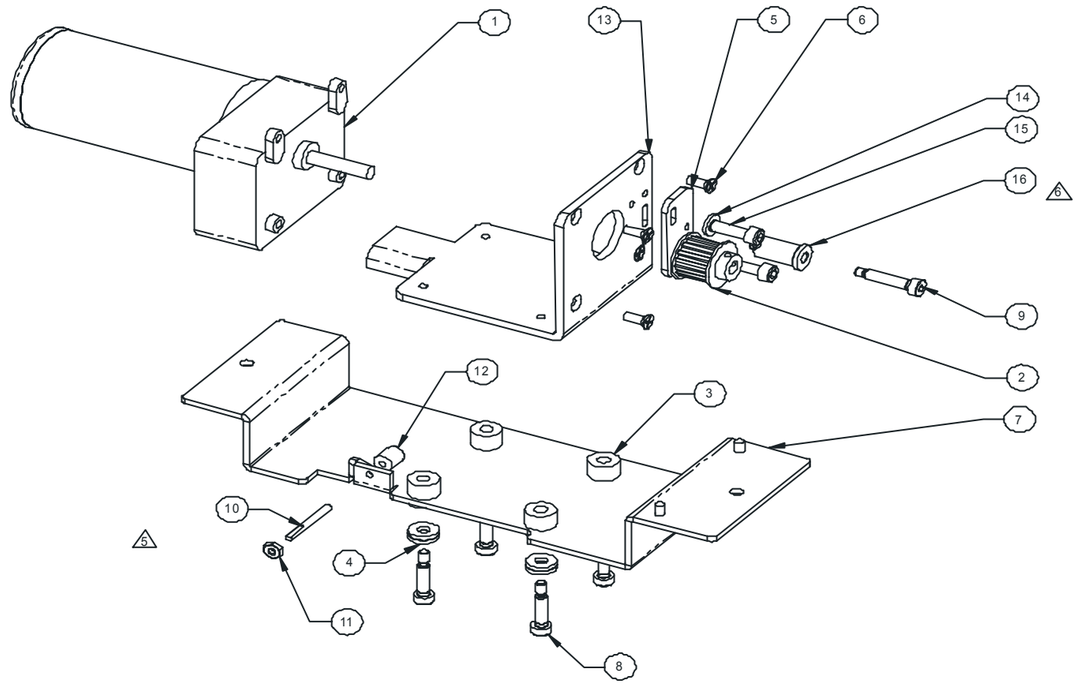
DRAWING INDEX

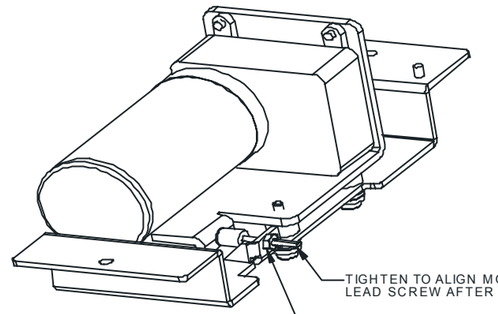
The following parts drawings are included in this manual:

Drawing Number	Description	Page Number
306909	Assembly, Motor Drive	8-3
306999	Column	8-4
307046	Assembly, Pendant Storage	8-5
304363	Assembly, Power Center, Right	8-6
304364	Assembly, Power Center, Left	8-7
306992	Assembly, Support, Left (Two Sheets)	8-8
304126	Assembly, Support, Right (Two Sheets)	8-10
304294	Assembly, Back Linkage, Left	8-12
304295	Assembly, Back Linkage, Right	8-13
304146	Assembly, Cylinder, Back, Right	8-14
306994	Assembly, Cylinder, Back, Left	8-15
304493	Assembly, Cylinder, Leg, Right	8-16
306995	Assembly, Cylinder, Leg, Left	8-17
304296	Assembly, Kidney Linkage, Left	8-18

Drawing Number	Description	Page Number
304297	Assembly, Kidney Linkage, Right	8-19
304299	Assembly, Cylinder, Kidney (36mm stroke)	8-20
304491	Assembly, Cylinder, Kidney (30mm stroke)	8-21
304121	Assembly, Back Section (Two Sheets)	8-22
304120	Assembly, Leg Section (Two Sheets)	8-24
304409	Assembly, Leg Frame, Right	8-26
304410	Assembly, Leg Frame, Left	8-27
306469	Assembly, Latch, Leg Section	8-28
307031	Assembly, Kidney Switch and Bracket	8-29
307020	Assembly, Handle Foot Pump	8-30
306762	Fluid, Hydraulic, For C8 Column Only	8-31
304910	Pad Set, 2” Sofpad	8-32
OZ-750-8075	Gel Pad, 3 Piece Set, B 810	8-33

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20609	02/04/04
2	306906 WAS 306915	20612	02/10/04
3	REDUCE QTY OF 304874, ILLUS TENSIONER CHG	20633	03/19/04
4	CHANGED QTY ITEM 5	20655	05/06/04
5	ADDED ALIGNMENT COMPONENTS	20703	06/25/04
6	DELETED 306902; ADDED 307027	20751	09/13/04





ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	306907	SLIDE MOTOR	1
2	306876	PULLEY, SLIDE MOTOR	1
3	306911	GROMMET	4
4	306872	THRUST WASHER, NYLON	8
5	306904	TENSIONER ARM	1
6	306914	SCREW, 10-32 X .5" LG, FLTHD PHL., SS	4
7	306851	MOTOR MOUNT PLATE	1
8	306912	SCREW, SHOULDER, 6 MM X 20 MM LONG, SS	4
9	306925	SCREW, SHOULDER, SHCS, 6 MM. DIA X 25 MM LG., SS	1
10	306973	STUD, 8-32 W/FLATS	1
11	306974	HEX NUT, 8-32	1
12	306972	BUMPER, PULYURETHANE	1
13	306905	MOUNT BRACKET	1
14	306874	WASHER, FLAT 6 MM, NARROW, 6.87 X 13.0 X 1.75 THK., ZP	2
15	304336	M6 x 1.0 x 20 Hex SHCS	2
16	307027	PULLEY, TENSIONER	1

5 5 5

6

DIMENSIONS ARE MILLIMETERS UNLESS OTHERWISE SPECIFIED. TOLERANCES ARE:
X.X ± 0.500 MM
X.XX ± 0.250 MM
X.XXX ±0.125 MM
ANGLE ±1/2°

SCALE 1:1

BREAK ALL CORNERS UNLESS SPECIFIED

THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN	
ENGR	

MATERIAL
- -

FINISH
- -

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MOTOR ASSEMBLY

SIZE	DWG. NO.	REV.
C	306909	06

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SHEET 1 OF 1

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REVISIONS			
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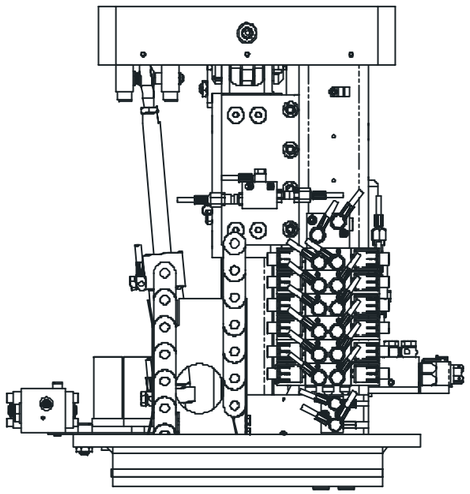
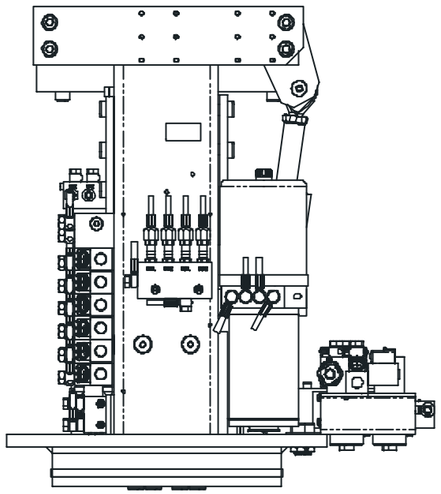
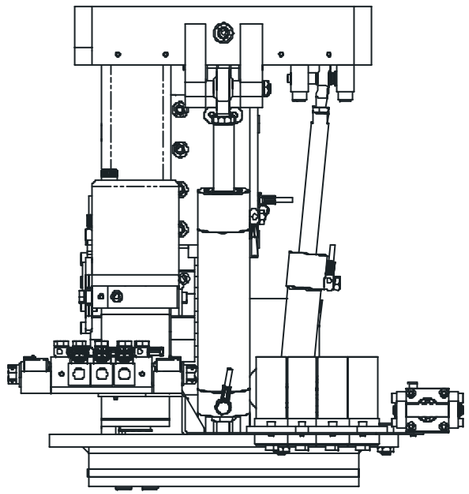
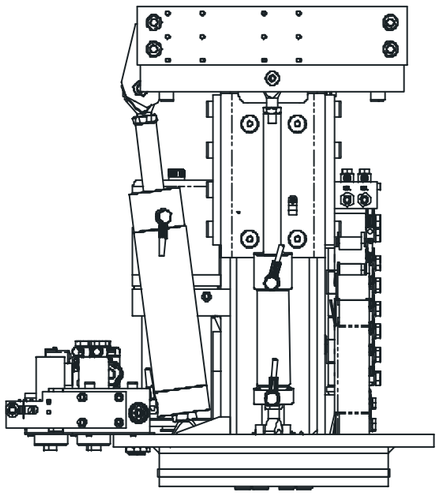
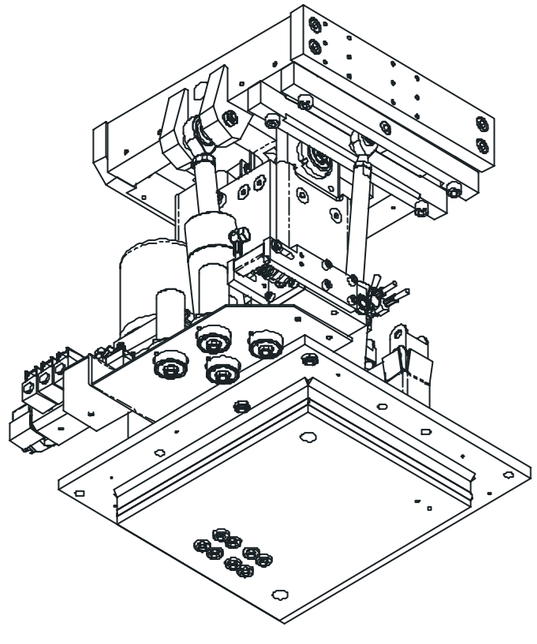
3	- -	3	- -

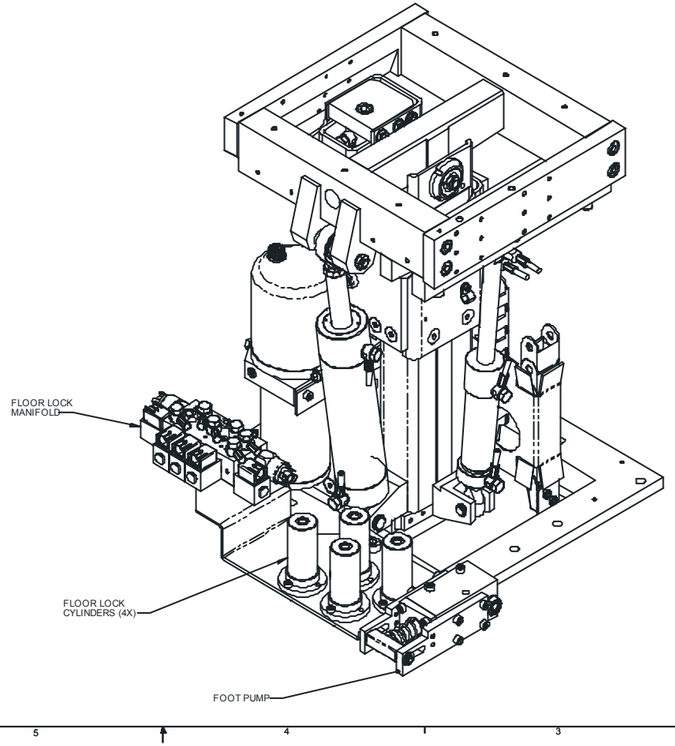












NOTES:
1. NOT SHOWN:
   - ALL HOSES
   - LEG CYLINDERS
   - BACK CYLINDERS
   - KIDNEY CYLINDERS
2. SYSTEM IS SHIPPED CLOSED FROM MANUFACTURER
3. TEST DOCUMENTATION INCLUDED WITH EACHASSEMBLY
4. SERIAL NUMBER OF COLUMN IS LABELEDALSO ON EACH OF THE FOLLOWING
   - LEG CYLINDERS
   - BACK CYLINDERS

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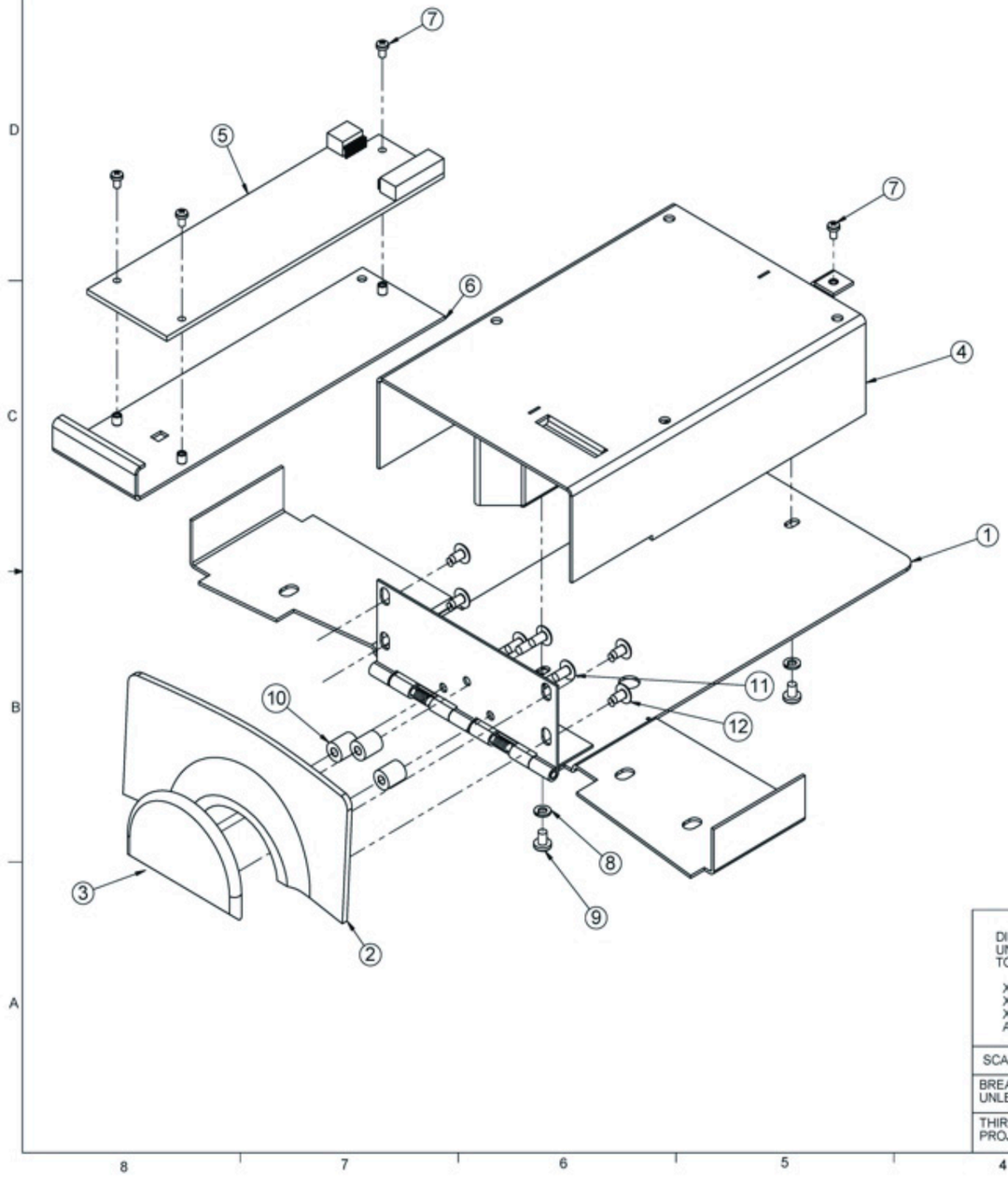
KIT, HYDRAULIC SYSTEM, CLOSED

D | 306999 | 01



REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20684	01/03/05
2	- -	2	- -
3	- -	3	- -

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	307044	Insert Base Plate Assembly	1
2	307050	Insert Door Molded Face Plate - Modified	1
3	307053	Insert Door Handle	1
4	307045	Insert U-Channel Assembly	1
5	307048	Insert PCB Assembly	1
6	307047	Insert PCB Mounting Plate	1
7	306486	M3 x 0.5 x 5 Cross Recessed PHMS	4
8	304807	LOCK WASHET, SPRING M4	2
9	306539	M4 x 0.7 x 6 Cross Recessed PHMS	2
10	306926	SPACER, NYLON 4.1X11X9.5	3
11	306915	JIS B 1111 Truss head screw M4 x 16	3
12	306647	JIS B 1111 Truss head screw M4 x 6	4

DIMENSIONS ARE MILLIMETERS UNLESS OTHERWISE SPECIFIED.
TOLERANCES ARE:

X.X	± 0.500 MM
X.XX	± 0.250 MM
X.XXX	±0.125 MM
ANGLE	±1/2°

SCALE 1:1

BREAK ALL CORNERS UNLESS SPECIFIED

THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN	
ENGR	

MATERIAL: N/A

FINISH: N/A

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Charleston, SC 29406

ASS'Y, INSERT, AUXILLIARY PENDANT

SIZE	DWG. NO.	REV.
B	307046	01

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DRAWING NO. 304363

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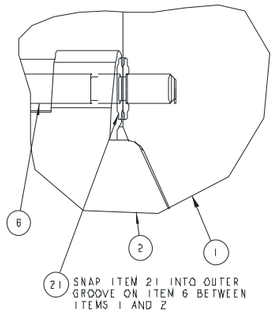
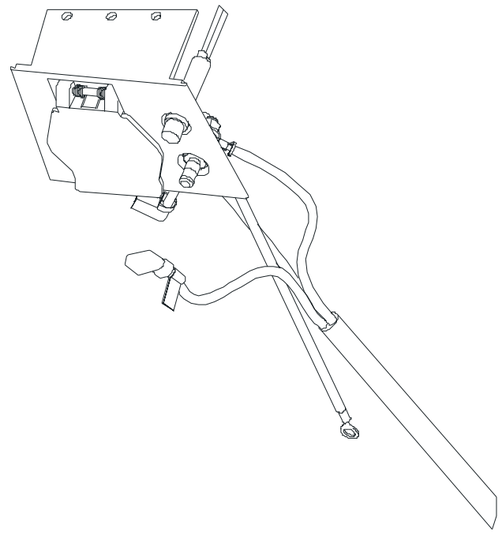
REPRODUCTION MUST BEAR THIS ENTIRE LEGEND.

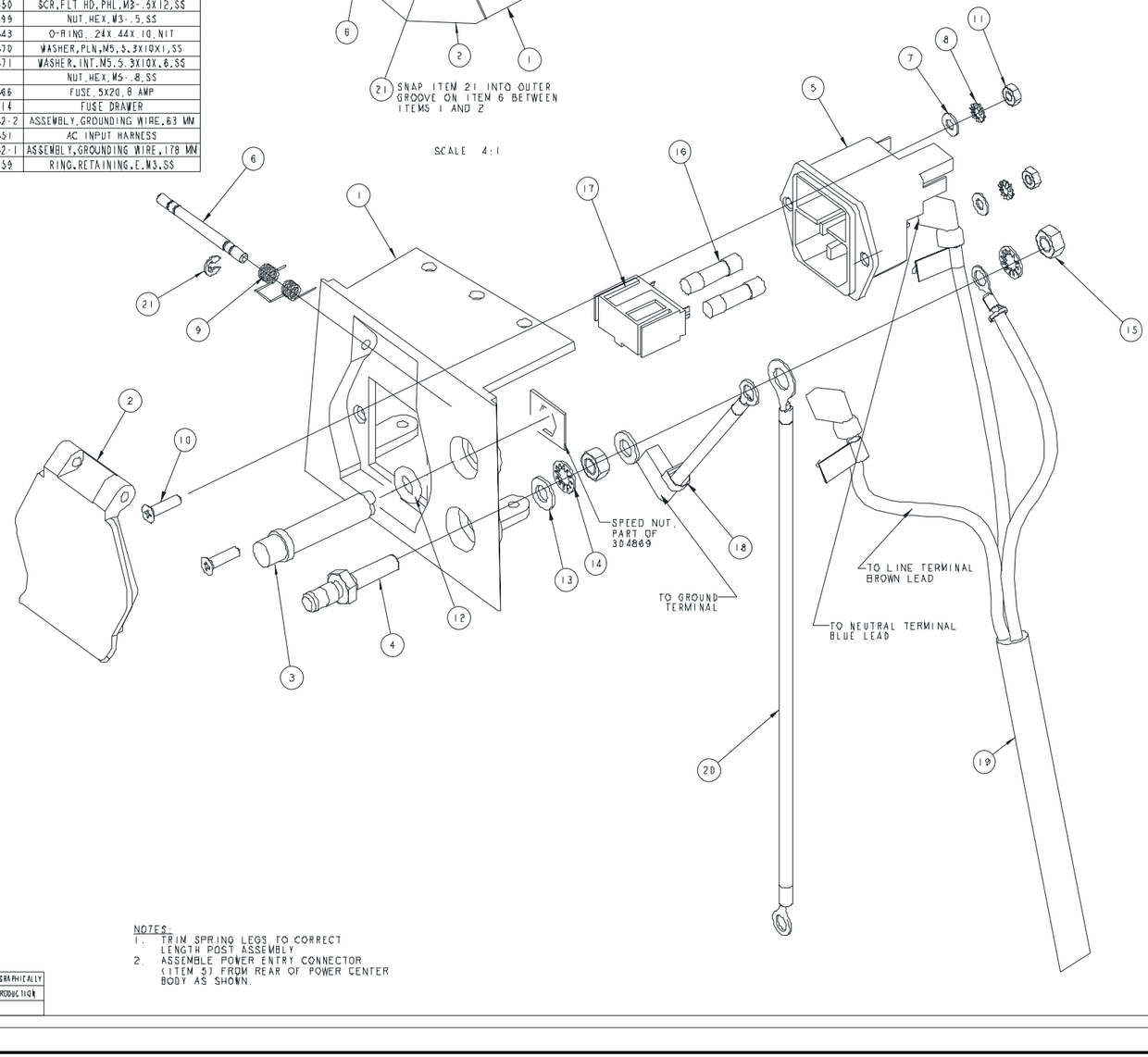
LIST OF MATERIALS

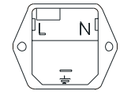
ITEM	QTY	PART#	DESCRIPTION
1	1	304365	BODY, POWER CENTER, RIGHT
2	1	304366	DOOR, SOCKET
3	1	304869	ASSEMBLY, LED
4	1	304844	POST, GROUNDING
5	1	083371	CONNECTOR, POWER ENTRY
6	1	304430	PIN, CUSTOM, M3X40, SS
7	2	304432	WASHER, PLN, M3, 3.2X7X.5, SS
8	2	11RON1903	WASHER, EXT, M3, 3.2X6X.4, ZP
9	1	304274	SPRING, TORSION, M4.75 X 14.9
10	2	304450	SCR, FLT HD, PHL, M3-.6X12, SS
11	2	304199	NUT, HEX, M3-.5, SS
12	1	304843	O-RING, .24X.44X.10, NIT
13	2	304870	WASHER, PLN, M5, 5.3X10X1, SS
14	2	304871	WASHER, INT, M5.5, 3X10X.8, SS
15	2		NUT, HEX, M5-.8, SS
16	2	304866	FUSE, 5X20, 8 AMP
17	1	063114	FUSE DRAWER
18	1	304852-2	ASSEMBLY, GROUNDING WIRE, 63 MM
19	1	304851	AC INPUT HARNESS
20	1	304852-1	ASSEMBLY, GROUNDING WIRE, 178 MM
21	1	305759	RING, RETAINING, E, M3, SS



SCALE 4:1







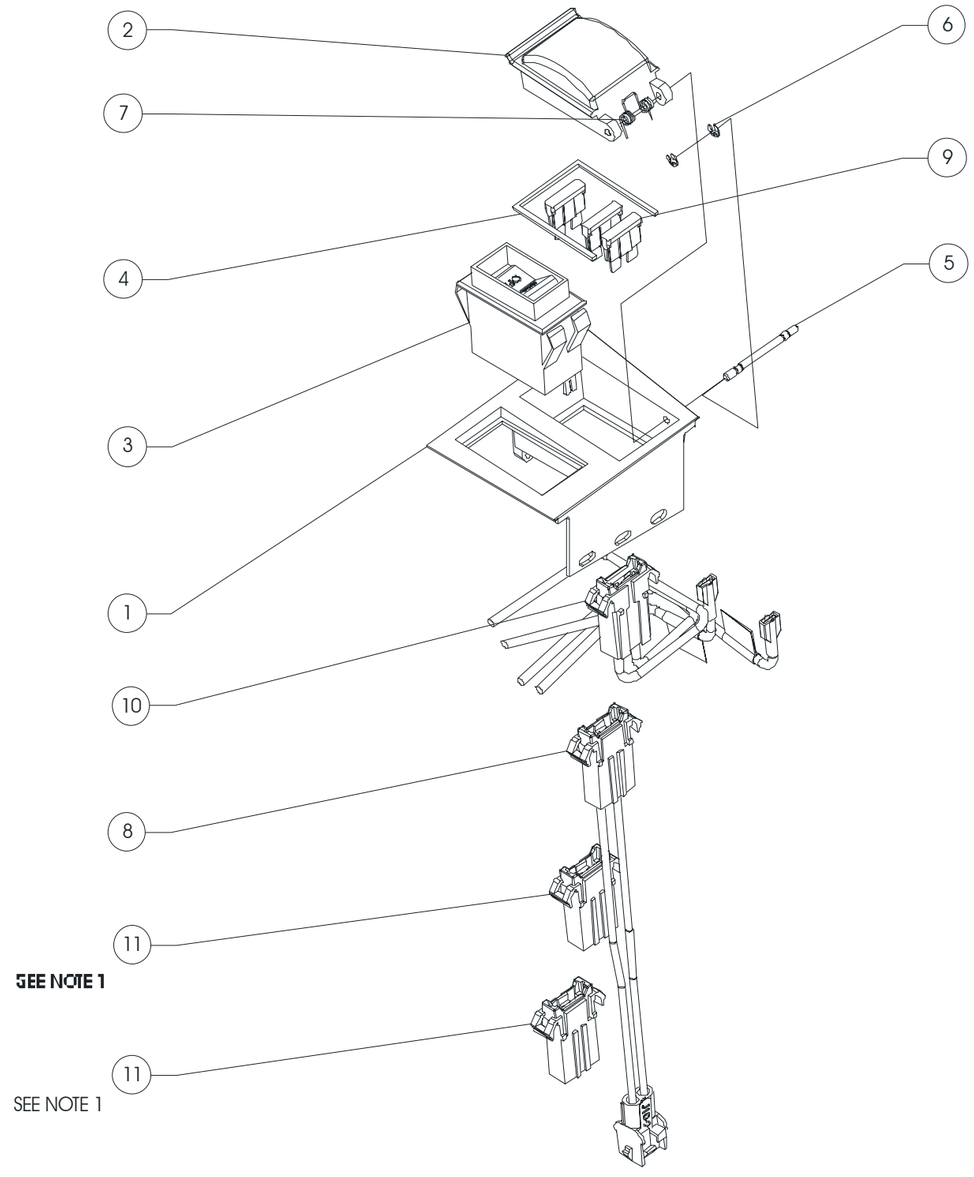
REAR VIEW OF ITEM 5

NOTES:
1. TRIM SPRING LEGS TO CORRECT LENGTH POST ASSEMBLY
2. ASSEMBLE POWER ENTRY CONNECTOR (ITEM 5) FROM REAR OF POWER CENTER BODY AS SHOWN.

REV	ECN#	DATE	BY	REVISION
B	21465	11/17/00	DLL	CHANGE ITEM 1 GRAPHICALLY
A	21080	10/20/00	MAR	RELEASE TO PRODUCTION

MATERIAL:
FINISH:
BERCHTOLD
ALL DIMENSIONS IN MM
DIMENSION TOLERANCES UNLESS OTHERWISE SPECIFIED
THREE DECIMAL PLACES ± .127
TWO DECIMAL PLACES ± .25
ONE DECIMAL PLACE ± .5
ANGLES ± 0°11'2"
DRAWN LPH 8/27/99
CAD NAME DRW 304363
SHEET 1 OF 1
SCALE 3:2
TITLE: ASSEMBLY, POWER CENTER, RIGHT
SIZE D
DRAWING NO. 304363
REV. B

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20683	12/07/04
2	- -	2	- -
3	- -	3	- -



NOTE:
1. DO NOT USE TERMINALS IN ITEM 11 (SUPPLIED WITH FUSE HOLDER)

ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY.
1	304368	HOUSING, POWER CENTER, LEFT	1
2	304370	DOOR, FUSE	1
3	304846	SWITCH, CIRCUIT BREAKER	1
4	304919	GASKET, FUSE DOOR	1
5	304430	PIN, CUSTOM, M3X40, SS	1
6	305759	RING, RETAINING, E, M3, SS	2
7	304274	SPRING, TORSION, M4.75 x 14.9	1
8	304856	HARNESS, PUMP FUSE	1
9	304849	FUSE, BLADE TYPE, 20 AMP	3
10	304859	ASSEMBLY, HARNESS, 24 V POWER	1
11	304848	FUSE HOLDER, LITTELFUSE 155 320U	2

DIMENSIONS ARE MILLIMETERS UNLESS OTHERWISE SPECIFIED.
TOLERANCES ARE:
X.X %%p 0.500 MM
X.XX %%p 0.250 MM
X.XXX %%p0.125 MM
ANGLE %%p1/2%%d

SCALE 1:2

BREAK ALL CORNERS UNLESS SPECIFIED

THIRD ANGLE PROJECTION

APPROVALS | DATE

DRAWN

ENGR

MATERIAL
- -

FINISH
- -

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ASSEMBLY, POWER CENTER, LEFT

SIZE B | DWG. NO. 304364 | REV. 01

DO NOT SCALE DRAWING | SHEET 1 OF 1

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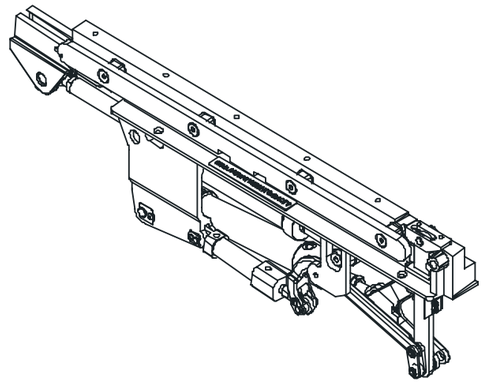
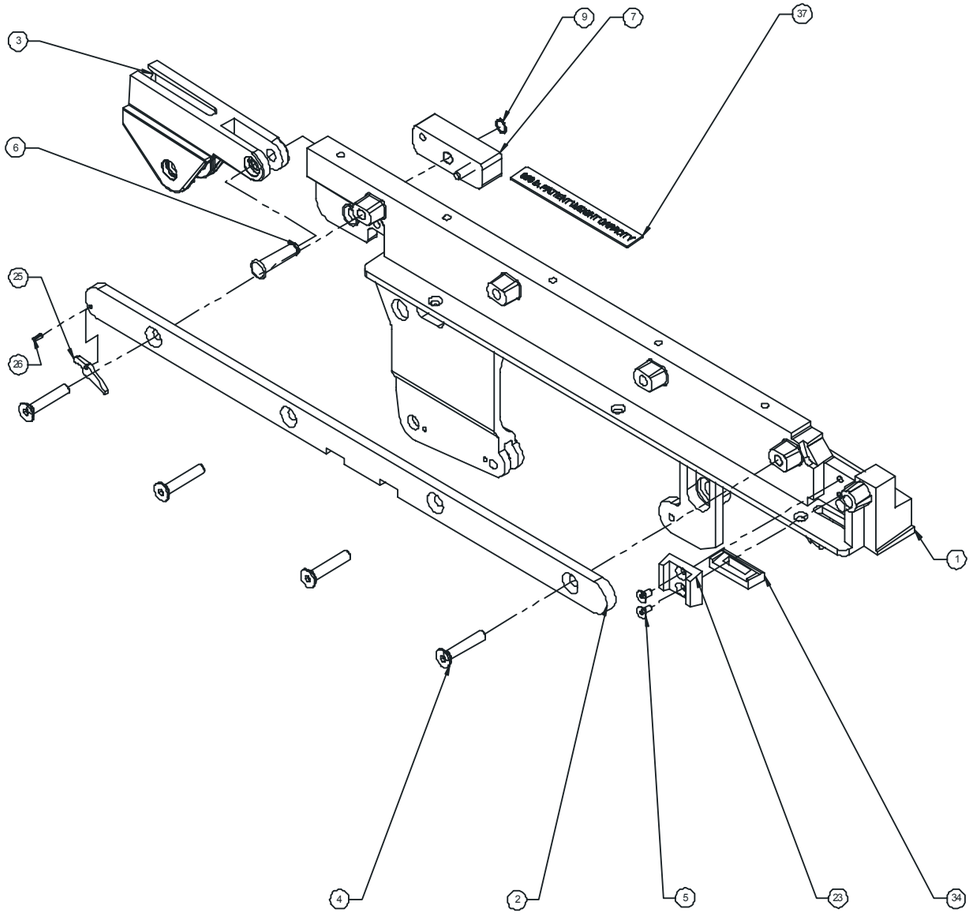
REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	1	03/17/05
2	- - -	2	- -
3	- -	3	- -





ITEM NO.	PART NUMBER	DESCRIPTION	VIEW 6/QTY.
1	304373	ASSEMBLY, INTERIOR FRAME, LEFT	1
2	304091	RAIL, SECTION LEFT	1
3	304805	ASSEMBLY, PIVOT LEG SECT, LEFT	1
4	306418	SCR, FLT HD, SOC, M8-1.25X45, DA	4
5	304920	SCR, FLT HD, SOC, M5-.8X10, SS	2
6	304095	PIN, CUSTOM, M10X42, SS	1
7	306397	ASSEMBLY, BLOCK, LEG, LEFT	1
8	304290	BEARING, CUSTOM, M12.1x16.6x12.3	1
9	304111	RING, RETAINING, EXT, M10, ST	1
10	304113	RING, RETAINING, EXT, M12, ST	1
11	304237	SCR, SHLDR, SOC, M10, 12X25, SS	1
12	304088	PIN, CUSTOM, M8X25, SS	1
13	304296	ASSEMBLY, KIDNEY LINKAGE, LEFT	1
14	304098	PIN, CUSTOM, M12x38.5, SS, LEG SECTION	1
15	304100	PIN, CUSTOM, M12X38, SS, BACK CYLINDER	1
16	304097	PIN, CUSTOM, M10x38, SS LINK FOLLOWER	1
17	304152	CLIP, RETAINING, EXT, M10, SS	2
18	304236	SCR, BTN HD, SOC, M4-.7X6, SS	3
19	304361	WASHER, PLN, M10, 10.0X21X1.6, SS	2
20	304804	WASHER, PLN, M8, 8.4X17X1.6, SS	1
21	304085	RETAINER, LIFT	2
22	304394	PIN, CUSTOM, M8x16, SS	1
23	304928	GUIDE, KIDNEY LIFT	1
24	304082	CRANK, LIFT	1
25	304178	LOCK, GRAVITY	1
26	304328	PIN, SPRING, M2.5x8, SS	1
27	306428	SL EEVE, BEARING, CRANK	1
28	306434	SCR, HEX HD, SOC, M6-1.0X20, ZP	1
29	304393	SPACER, LIFT	1
30	304391	PIN, CUSTOM, M8X23, SS	1
31	306393	CLIP, RETAINING, EXT, M12, SS	1
32	304392	RING, RETAINING, E, M6, ST	2
33	304839	RING, RETAINING, E, M7, SS	1
34	304379	SEAL, KIDNEY LIFT	1
35	304841	SUPPORT, PIVOT, LEFT MACHINED	1
36	304838	PIN, CUSTOM, M8X24, SS	1
37	306946	LABEL, CAPACITY	1
38	305791	SEALANT, 100% SILICON, BLACK	1
39	051537	LOCTITE, 242, BLUE	1
40	304320	ASSEMBLY, LINK, FOLLOWER, LEFT	1
41	307031	ASSY, KIDNEY SENSOR	1
42	307100	ASSEMBLY, CYLINDER, LEG LEFT	1
43	307099	ASSEMBLY, CYLINDER, BACK LEFT	1

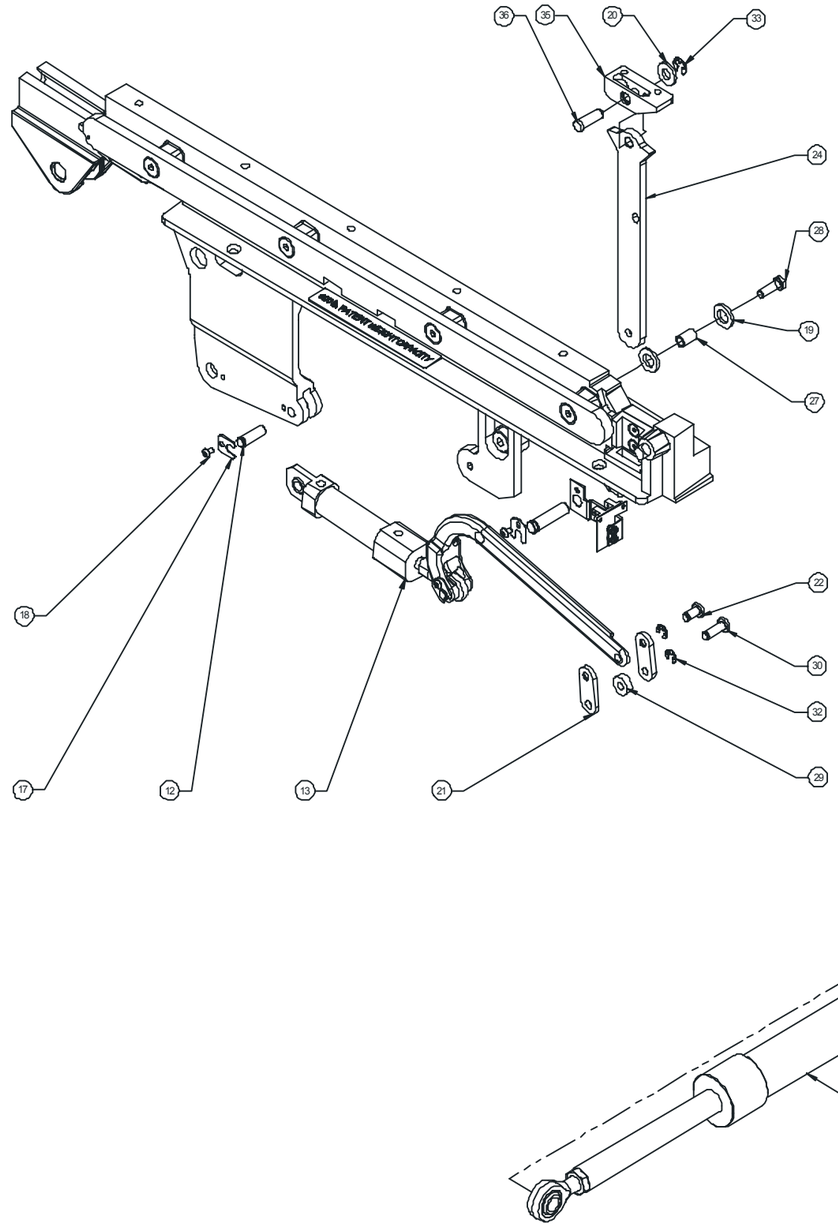
BERCHTOLD

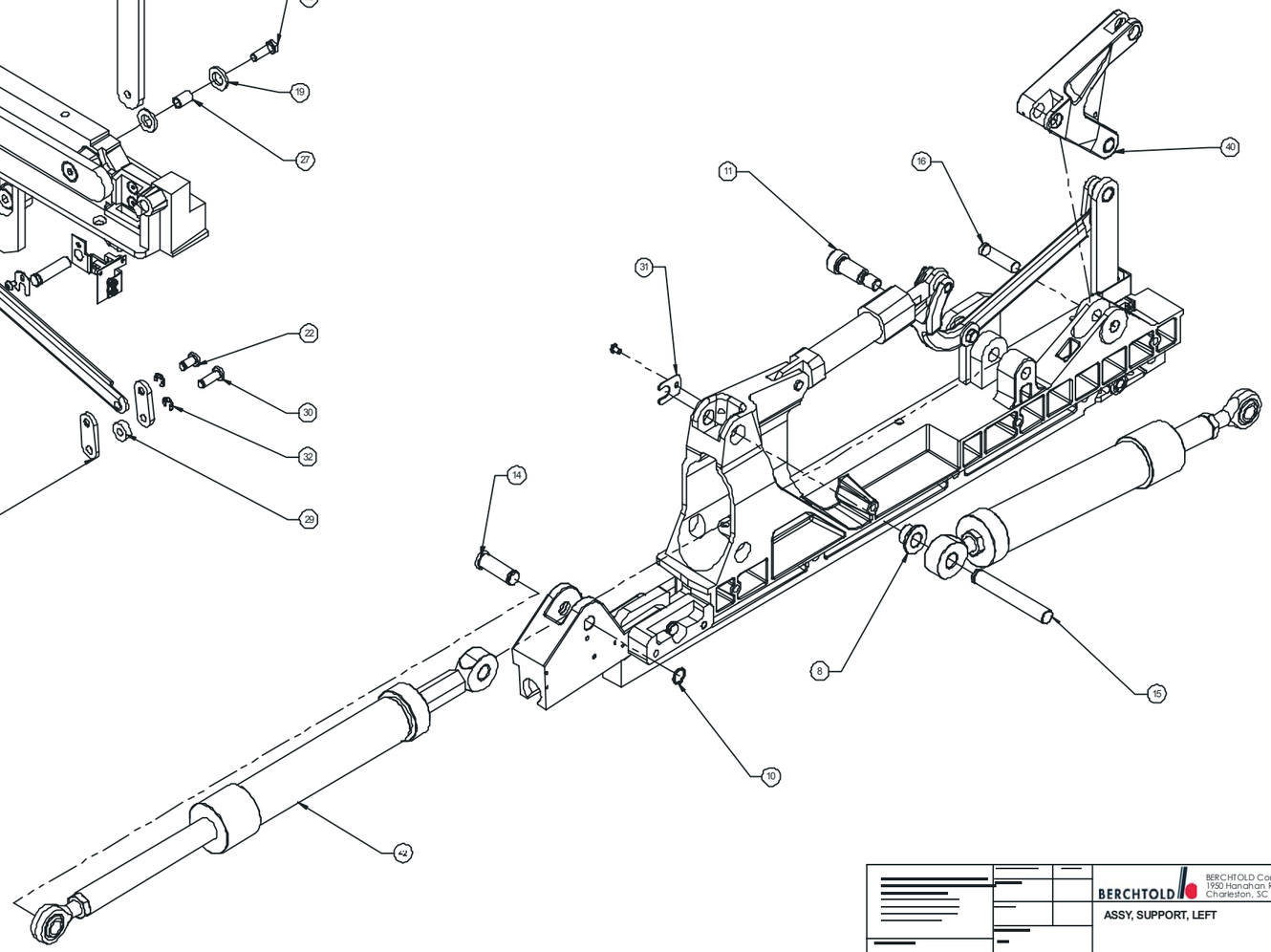
BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29406

ASSY, SUPPORT, LEFT

D | 306992 | 01

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	1	03/17/05
2	- - -	2	- -
3	- -	3	- -





BERCHTOLD

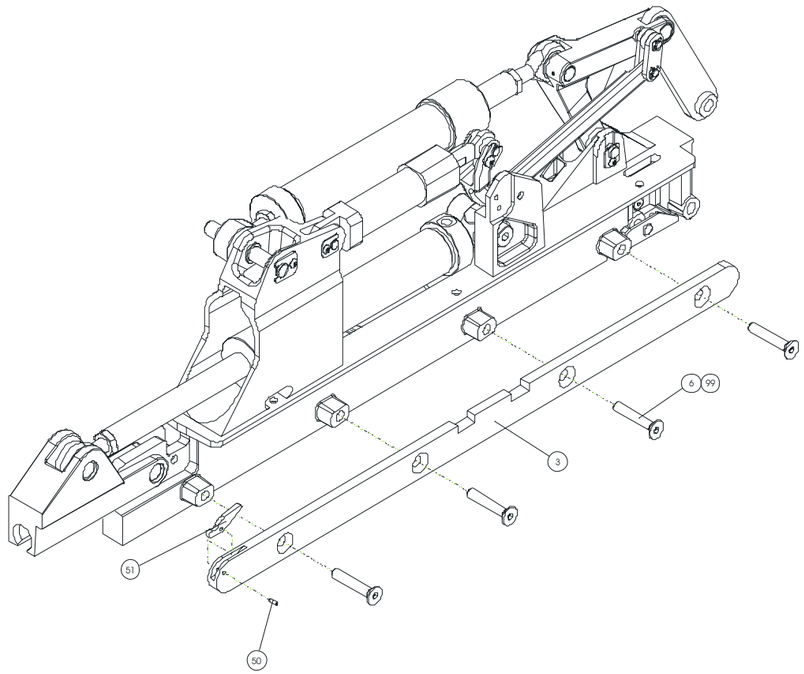
BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29406

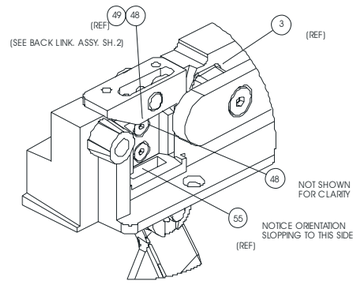
ASSY, SUPPORT, LEFT

D | 306992 | 01

PARTS

REVISIONS			
REV.	DESCRIPTION	ECO #	DATE
1	RELEASE	20676	09/17/04
2	- -	2	- -
3	- -	3	- -





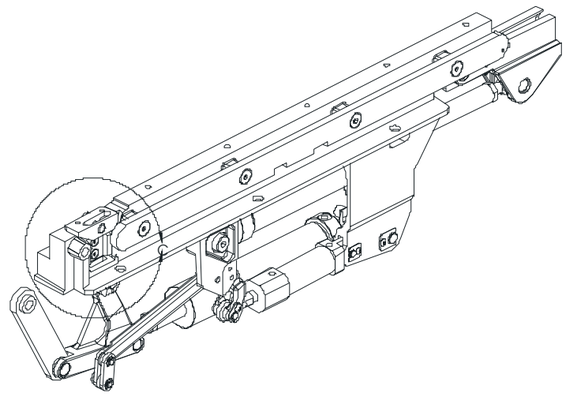
DETAIL C
SEE KIDNEY ASSY. SH. 2
SCALE 3 : 4

NOTES:
1) TORQUE 11 TO 12 FT-LBF.

2) APPLY A BEAD OF BLACK SILICONE AROUND LOWER EDGE OF SEAL AND INSERT INTO CHANNEL. WIPE OFF EXCESS.

3) ADJUST KIDNEY CLEVIS SO THAT THE PIVOT SUPPORT IS EVEN WITH THE TOP OF THE INTERIOR FRAME WHEN THE KIDNEY CYLINDER IS FULLY RETRACED

4) ADJUST THE LEG ROD END SO THAT THE LEG PIVOT IS BETWEEN +1 AND +2 ABOVE HORIZONTAL AS COMPARED TO THE TOP SURFACE OF THE INTERIOR FRAME.



LIST OF MATERIAL			
ITEM NO.	PART NUMBER	DESCRIPTION	Default/QTY
1	304374	ASSEMBLY, INTERIOR FRAME, RIGHT	1
2	304200	RAIL, SEAT, SECTION, RIGHT	1
3	304813	ASSEMBLY, PIVOT, LEG SECT, RIGHT	1
4	306418	SCR, FLT HD, SOC, M8-1.25X45, DA	4
5	304095	PIN, CUSTOM, M10X42, SS	1
6	304098	PIN, CUSTOM, M12x38.5, SS, LEG SECTION	1
7	304290	BEARING, CUSTOM, M12.1x16.6x12.3	1
8	306398	ASSEMBLY, BLOCK, LEG, RIGHT	1
9	304493	ASSEMBLY, CYLINDER, LEG RIGHT	1
10	304237	SCR, SHLDR, SOC, M10, 12X25, SS	1
11	304068	PIN, CUSTOM, M8X25, SS	1
12	304297	ASSEMBLY, KIDNEY LINKACE , RIGHT	1
13	304111	RING, RETAINING, EXT, M10, ST	1
14	304100	PIN, CUSTOM, M12X38, SS, BACK CYLINCER	1
15	304295	ASSEMBLY, BACK LINKAGE, RIGHT	1
16	304097	PIN, CUSTOM, M10x38, SS LINK FOLLOWER	1
17	304152	CLIP, RETAINING, EXT, M10, SS	2
18	304236	SCR, BTN HD, SOC, M4-.7X6, SS	3
19	304113	RING, RETAINING, EXT, M12, ST	1
20	304361	WASHER, PLN, M10, 10.0X21X1.6, SS	2
21	304085	RETAINER, LIFT	2
22	304394	PIN, CUSTOM, M6x16, SS	1
23	304928	GUIDE, KIDNEY LIFT	1
24	304920	SCR, FLT HD, SOC, M5-.8X10, SS	2
25	304328	PIN, SPRING, M2.5x8, SS	1
26	304178	LOCK, GRAVITY	1
27	306393	CLIP, RETAINING, EXT, M12, SS	1
28	306428	SLEEVE, BEARING, CRANK	1
29	306434	SCR, HEX HD, SOC, M6-1.0X20, ZP	1
30	304379	SEAL, KIDNEY LIFT	1
31	304082	CRANK, LIFT	1
32	304393	SPACER, LIFT	1
33	304391	PIN, CUSTOM, M6X23, SS	1
34	304392	RING, RETAINING, E, M6, ST	2
35	304840	SUPPORT, PIVOT, RIGHT	1
36	304838	PIN, CUSTOM, M8X24, SS	1
37	304804	WASHER, PLN, M8, 8.4X17X1.6, SS	1
38	304839	RING, RETAINING, E, M7, SS	1
98	305791	SEALANT, 100% SILICON, BLACK	1
99	051537	LOCTITE, 242, BLUE	1

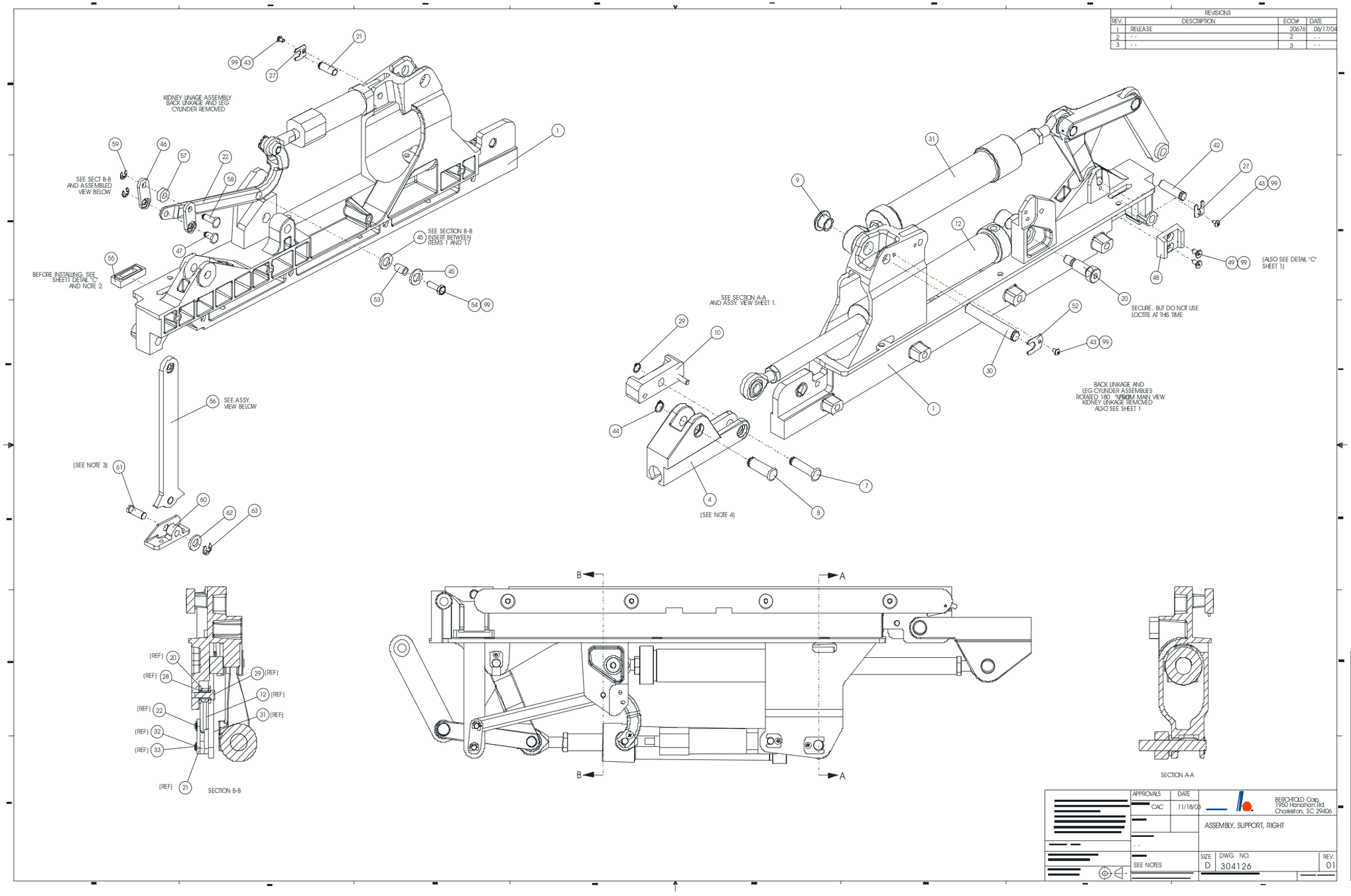
APPROVALS	DATE
CAC	11/18/08
- -	
SEE NOTES	

BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29406

ASSEMBLY, SUPPORT, RIGHT

SIZE	DWG. NO.	REV.
D	304126	01

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20676	06/17/04
2	- -	2	- -
3	- -	3	- -



DRAWING NO. 304294

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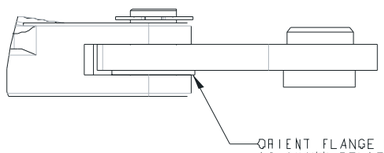
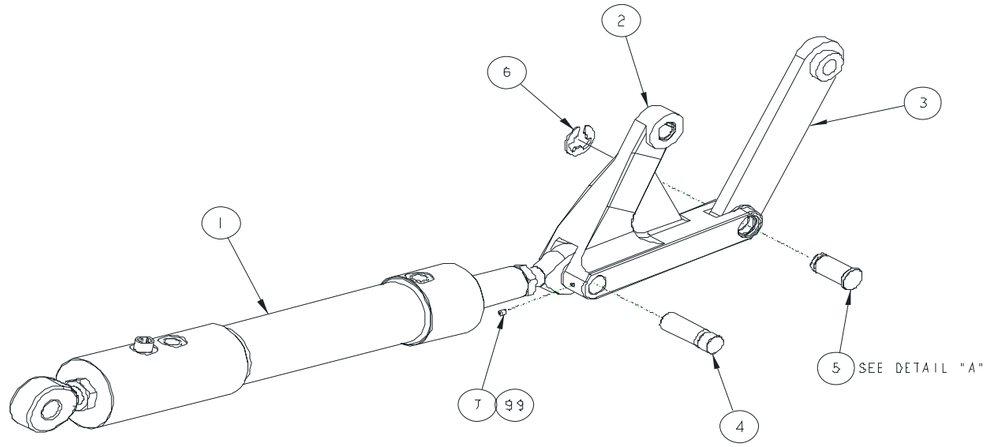
LIST OF MATERIALS

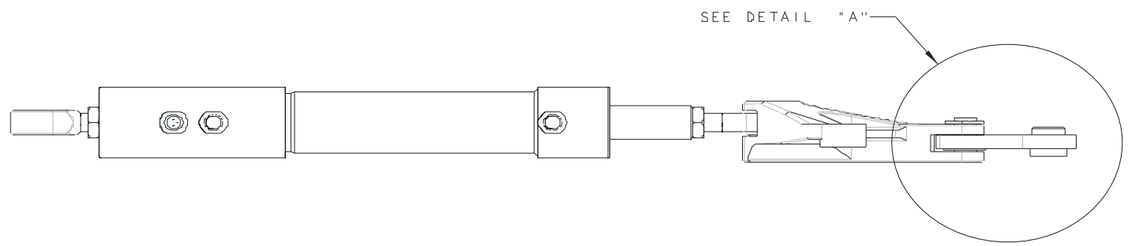
ITEM	QTY	PART#	DESCRIPTION
1	1	306442	ASSEMBLY, CYLINDER, BACK SENSOR, LEFT
2	1	304320	ASSEMBLY, LINK, FOLLOWER, LEFT
3	1	304066	ASSEMBLY. LINK, BACK SECTION
4	1	304234	PIN,CUSTOM,M12X37,SS
5	1	304096	PIN,CUSTOM,M12X27,SS
6	1	304775	RING,RETAINING,E,M11,SS
7	1	304930	SCR,SET,CONE PT,M3-.5X6,SS
99	AR	051537	LOCTITE, 242, BLUE

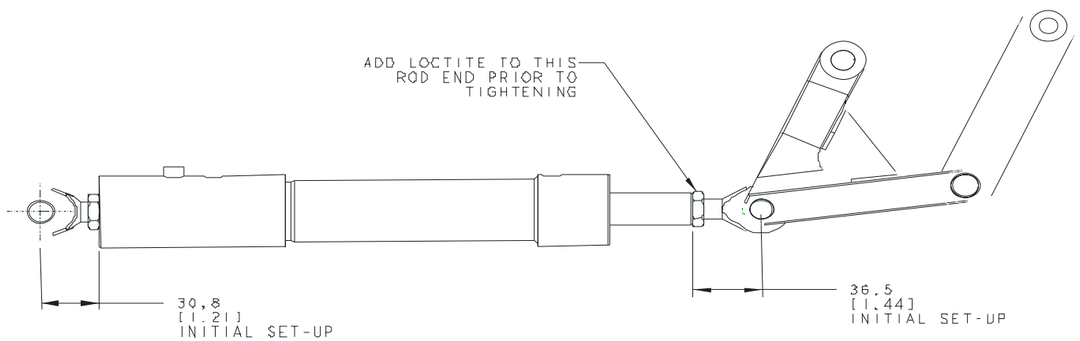


ORIENT FLANGE BEARING ON 304066 AS SHOWN RELATIVE TO THE 304320

DETAIL "A"
SCALE 1:1







REV	ECO#	DATE	BY	REVISION
A	21600X	12/7/00	MAB	RELEASED

MATERIAL: SEE ABOVE	ALL DIMENSIONS IN MM	DRAWN JMZ 7/23/98	
FINISH:	DIMENSION TOLERANCE UNLESS OTHERWISE SPECIFIED	CAD NAME DRW 304294	
BERCHTOLD Corp. 1950 Hanahan Rd. Charleston, SC 29406	THREE DECIMAL PLACES ± .125 TWO DECIMAL PLACES ± .25 ONE DECIMAL PLACE ± .5 ANGLES ± 0-1/2°	SHEET 1 OF 1 SCALE 1:2	
TITLE: ASSEMBLY, BACK LINKAGE, LEFT	SIZE: C	DRAWING NO. 304294	REV. A

DRAWING NO. 304295

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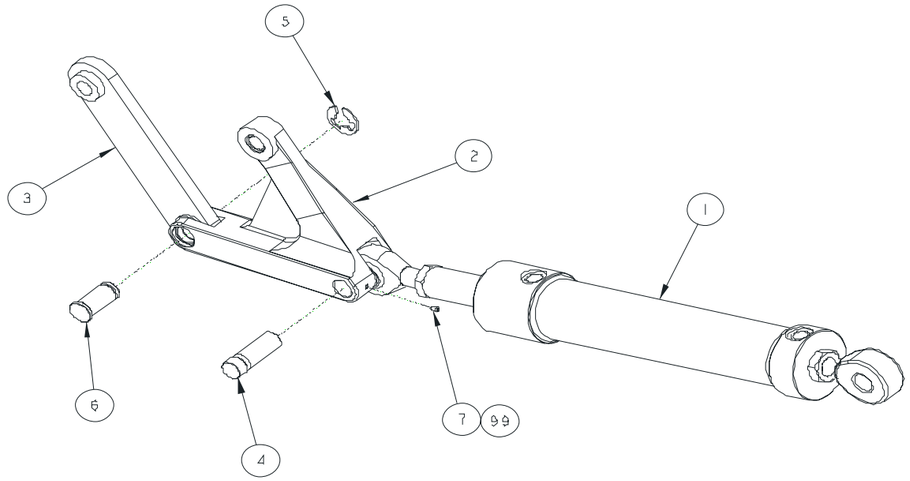
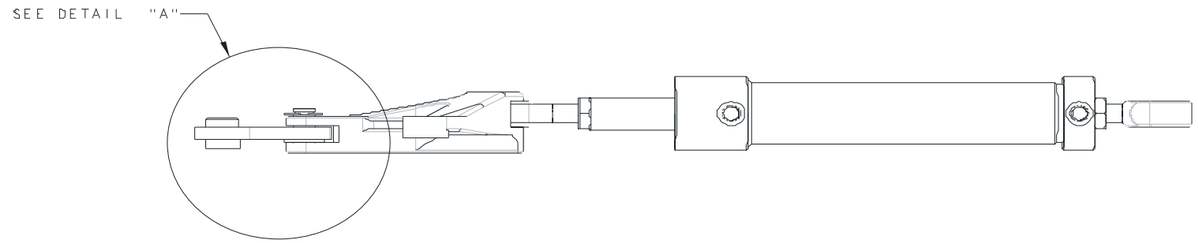
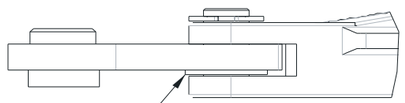
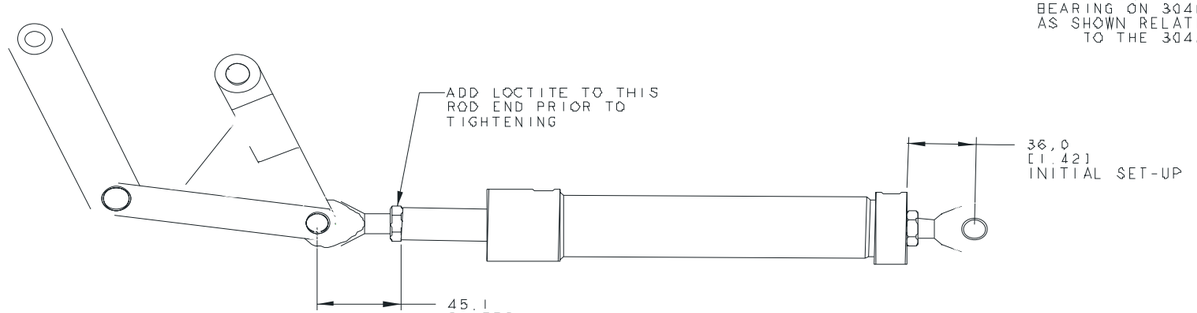
LIST OF MATERIALS			
ITEM	QTY	PART#	DESCRIPTION
1	1	304146	ASS'Y, CYLINDER, BACK RIGHT
2	1	304321	ASSEMBLY, LINK, FOLLOWER, RIGHT
3	1	304066	ASSEMBLY, LINK, BACK SECTION
4	1	304234	PIN,CUSTOM,M12X37,SS
5	1	304775	RING,RETAINING,E,M11,SS
6	1	304096	PIN,CUSTOM,M12X27,SS
7	1	304930	SCR,SET,CONE PT,M3-.5X5,SS
99	A/R	051537	LOCTITE, 242, BLUE







DETAIL "A"
SCALE 1:1



REV	ECN#	DATE	BY	REVISION
A	21600X	12/8/00	MAB	RELEASED

MATERIAL: SEE ABOVE
FINISH:

BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29405

PRIMARY DIMENSIONS IN MM.
DIMENSION TOLERANCE UNLESS OTHERWISE SPECIFIED:
THREE DECIMAL PLACES ±.125
TWO DECIMAL PLACES ±.25
ONE DECIMAL PLACE ±.5
ANGLES ±0-17'
DIMENSIONS IN BRACKETS ARE IN INCHES AND FOR REFERENCE ONLY.

DRAWN JMZ 7/23/98
CAD NAME DRW 304295
SHEET 1 OF 1
SCALE 1:2

TITLE: ASSEMBLY, BACK LINKAGE, RIGHT
SIZE: C
DRAWING NO. 304295
REV. A

DRAWING NO. 304146

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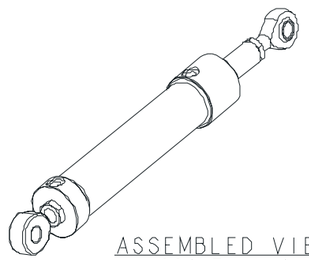
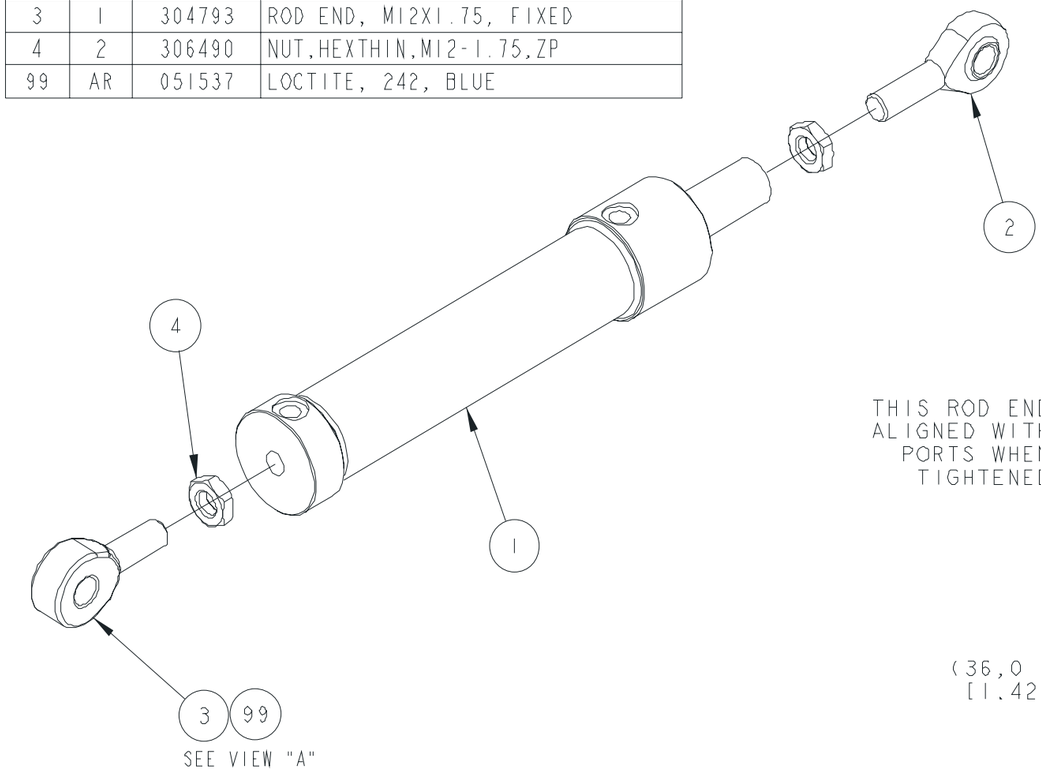
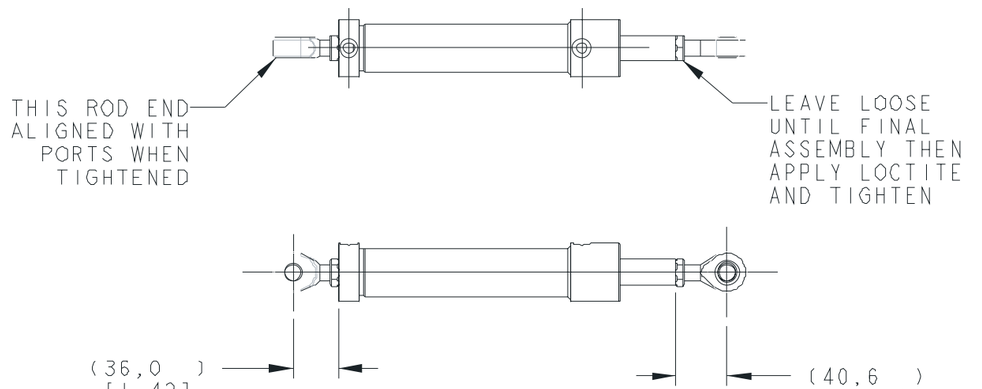
LIST OF MATERIALS			
ITEM	QTY	PART#	DESCRIPTION
1	1	304175	CYLINDER, LV32, STROKE 135 MM
2	1	304451	ROD END,M12X1.75
3	1	304793	ROD END, M12X1.75, FIXED
4	2	306490	NUT,HEXTHIN,M12-1.75,ZP
99	AR	051537	LOCTITE, 242, BLUE



ASSEMBLED VIEW
SCALE 1:4



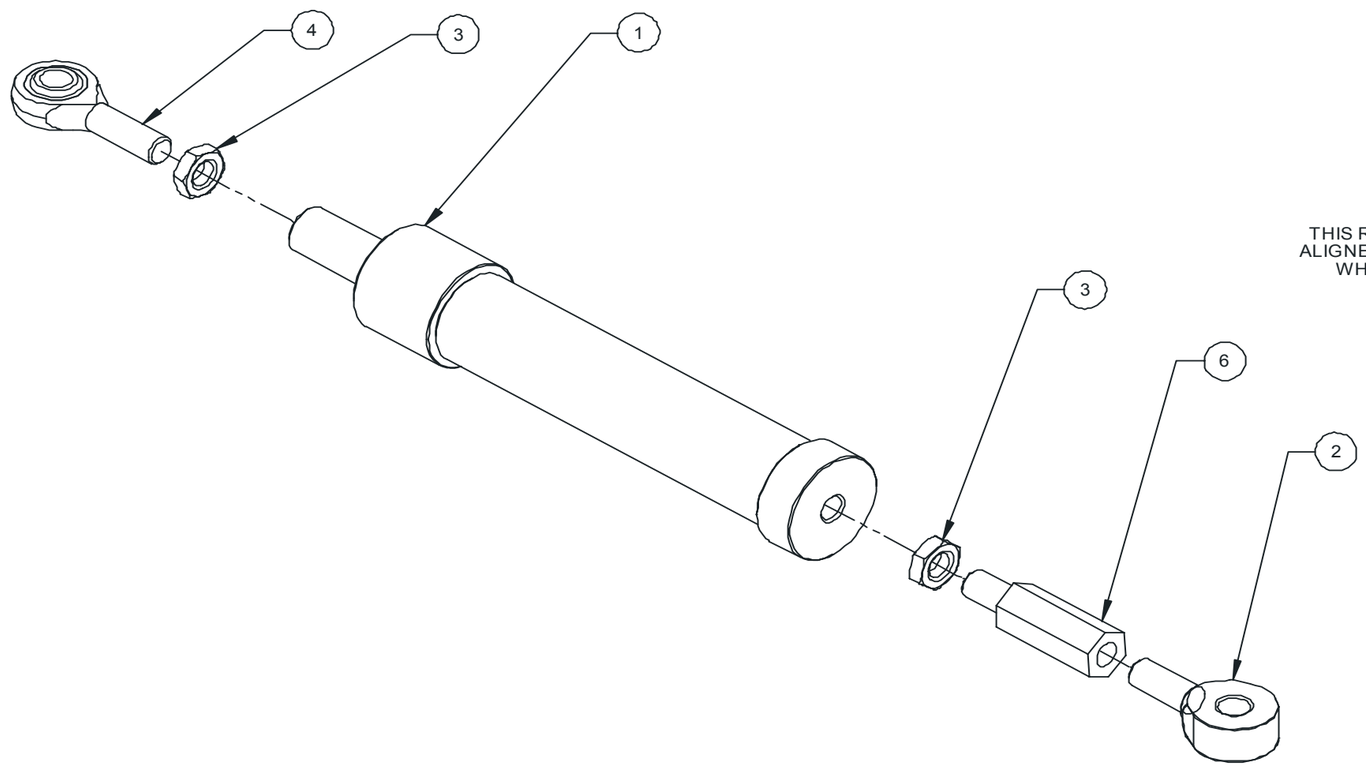

THIS ROD END ALIGNED WITH PORTS WHEN TIGHTENED
LEAVE LOOSE UNTIL FINAL ASSEMBLY THEN APPLY LOCTITE AND TIGHTEN
(36,0) [1.42]
(40,6) [1.60]

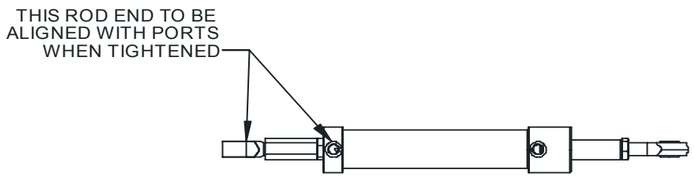
VIEW "A"
SCALE 1:4

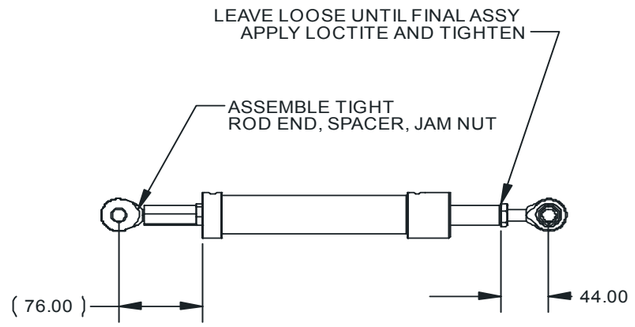
SYM	ECO#	DATE	BY	REVISION
A	21600X	12/7/00	MAB	RELEASED

MATERIAL: SEE ABOVE	ALL DIMENSIONS IN MM	DRAWN BBB 10/14/99	
FINISH:	DIMENSION TOLERANCE UNLESS OTHERWISE SPECIFIED	CAD NAME DRW 304146	
BERCHTOLD Corp. 1950 Hanahan Rd. Charleston, SC 29406	THREE DECIMAL PLACES ±.125 TWO DECIMAL PLACES ±.25 ONE DECIMAL PLACE ±.5 ANGLES ± 0-1/2°	SHEET 1 OF 1	SCALE 1:2
TITLE: ASS'Y, CYLINDER, BACK RIGHT	SIZE B	DRAWING NO. 304146	REV A

REVISIONS			
REV.	DESCRIPTION	ECO#	DATE
1	RELEASE	20834	03/23/05
2	- -	2	- -
3	- -	3	- -







ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	307099	Cylinder, Back Left, LV32, Stroke 135mm	1
2	304793	ROD END, M12X1.75, FIXED	1
3	306490	NUT, HEXTHIN, M12-1.75, ZP	2
4	304451	ROD END, M12X1.75	1
5	051537	LOCTITE, 242, BLUE	1
6	307003	STANDOFF, THREADED M/F M12	1

DIMENSIONS ARE MILLIMETERS
UNLESS OTHERWISE SPECIFIED.
TOLERANCES ARE:

X.X ± 0.500 MM
X.XX ± 0.250 MM
X.XXX ±0.125 MM
ANGLE ±1/2°

SCALE 1:2

BREAK ALL CORNERS
UNLESS SPECIFIED

THIRD ANGLE
PROJECTION

APPROVALS	DATE
DRAWN	
ENGR	

MATERIAL
- -

FINISH
- -

CAD GENERATED DRAWING.
DO NOT MANUALLY UPDATE

BERCHTOLD Corp.
1950 Hanahan Rd.
Charleston, SC 29406

ASSEMBLY, BACK CYLINDER, LEFT

SIZE	DWG. NO.	REV.
B	**306994**	**01**

DO NOT SCALE DRAWING

SHEET 1 OF 1

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ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF BERCHTOLD IS PROHIBITED.

DRAWING NO. 304493

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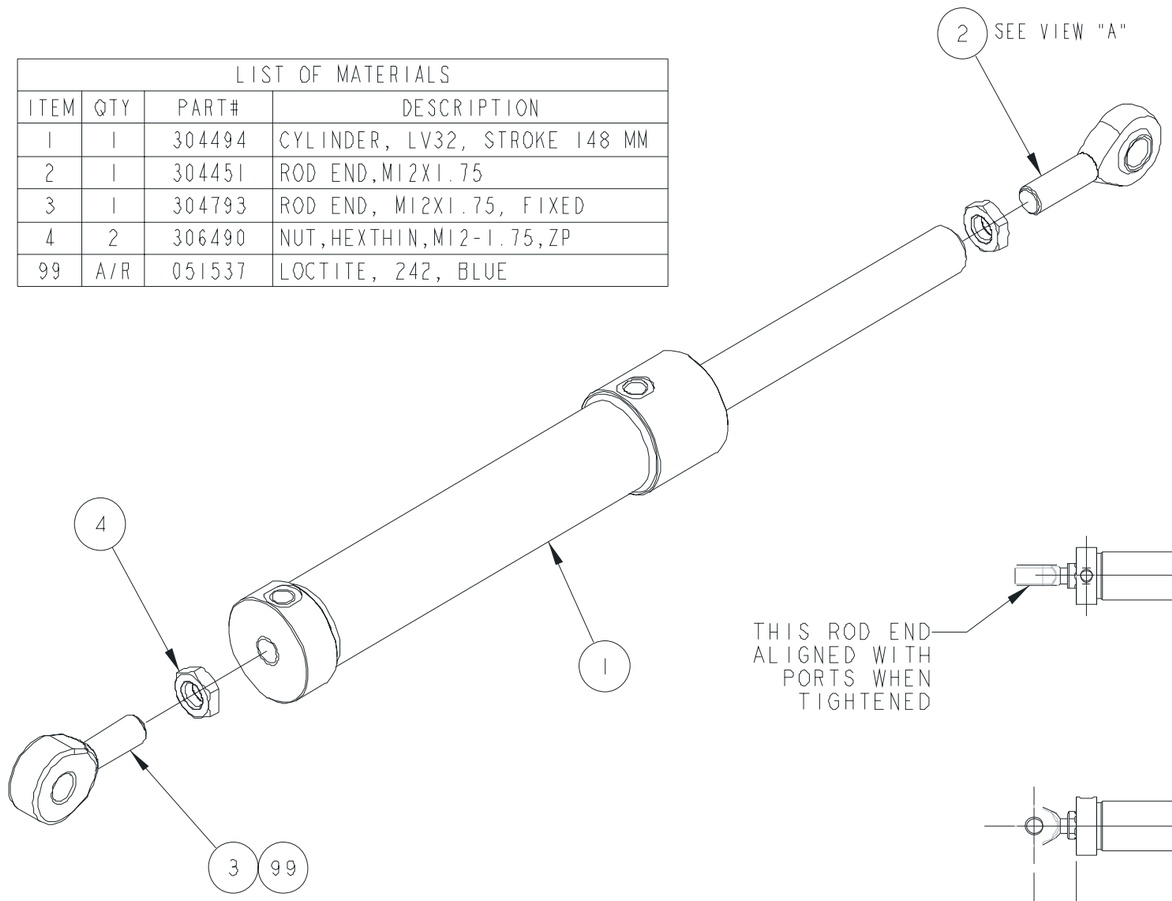
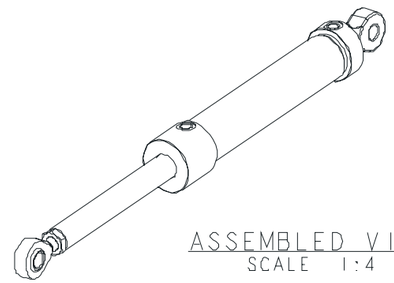
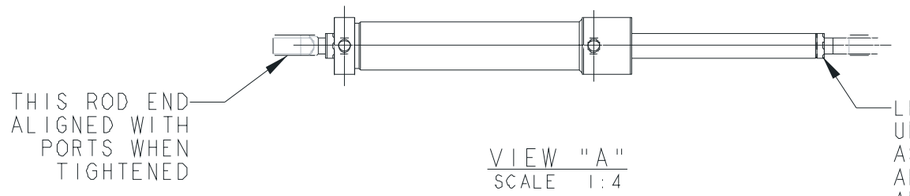
LIST OF MATERIALS			
ITEM	QTY	PART#	DESCRIPTION
1	1	304494	CYLINDER, LV32, STROKE 148 MM
2	1	304451	ROD END,M12X1.75
3	1	304793	ROD END, M12X1.75, FIXED
4	2	306490	NUT,HEXTHIN,M12-1.75,ZP
99	A/R	051537	LOCTITE, 242, BLUE

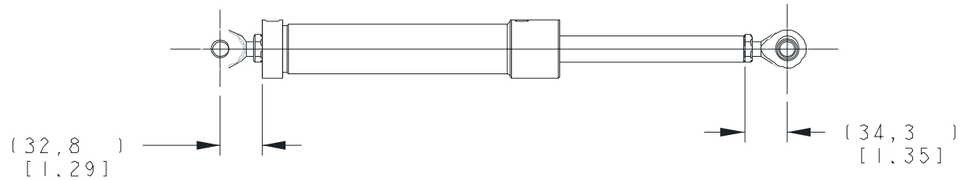




ASSEMBLED VIEW
SCALE 1:4



VIEW "A"
SCALE 1:4



SYM	ECO#	DATE	BY	REVISION
A	21600X	12/8/00	MAB	RELEASED

MATERIAL: SEE ABOVE	ALL DIMENSIONS IN MM	DRAWN BBB 10/14/99	
FINISH:	DIMENSION TOLERANCE UNLESS OTHERWISE SPECIFIED	CAD NAME DRW 304493	
BERCHTOLD 950 Hanahan Rd. Charleston, SC 29405	THREE DECIMAL PLACES ±.125 TWO DECIMAL PLACES ±.25 ONE DECIMAL PLACE ±.5 ANGLES ±0-1/2°	SHEET 1 OF 1	
		SCALE 1:2	
TITLE: ASSEMBLY, CYLINDER, LEG RIGHT	SIZE B	DRAWING NO. 304493	REV A